Bulldog High School Academic Tournament 2018 (XXVII): After such knowledge, what forgiveness?
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Edited by Jacob Reed, with Stephen Eltinge and Eddie Kim

Packet 12 Tossups
1. **One side in this war held most of its elite troops in reserve due to tensions over the territories of Picton, Lennox, and Nueva. The other side in this war based its two aircraft carriers at Ascension Island. During this war, a radio station announced the capture of Goose Green before it had actually been taken. A nuclear submarine controversially sank the old ship (*)** *General Belgrano* during this war, which forced the resignation of Leopoldo Galtieri. This war, which included invasions of the South Sandwich Islands and South Georgia, helped re-elect Margaret Thatcher. For 10 points, name this 1982 war between Britain and Argentina over some islands in the South Atlantic.
ANSWER: **Falklands** War [accept any answer describing a **conflict** over the **Falkland** Islands; accept **Malvinas** War; prompt on South Atlantic War] <SPQR>

2. *Description acceptable.* **This kind of art has been sponsored by a "Program" directed by Jane Golden in Philadelphia. A creator of this kind of art later went on to paint motifs like griots** ["gree-ohz"] **and skulls in paintings like *Flexible*. A maker of this kind of art is known for painting red, heart-shaped balloons. Another maker of this kind of art signed many works "SAMO"** ["same-oh"]. **Examples of it include Keith (*)** Haring's *Crack is Wack*, with no "h." A creator of this kind of art was depicted in the documentary *Exit Through the Gift Shop*. Before he made easel paintings, Jean-Michel Basquiat was known for this kind of art. Banksy makes—for 10 points—what kind of art often done in spray paint?
ANSWER: **street art** [accept **graffiti**; accept **guerilla** art; prompt on murals or public art] <JR>

3. **One character in this story attempts to reassure another by remembering how he helped his grandfather whip a Quaker woman and his father set fire to a Indian village. That character in this story later angrily tosses a black, eerily serpentine staff to Goody Cloyse. This story's protagonist grabs that staff and runs in a mad frenzy after discovering his wife's pink ribbon on a (*)** branch. The protagonist of this short story is stunned to find Deacon Gookin participating in an induction ceremony for himself and his wife Faith. The title man discovers that his entire town is involved in a Satanic cult in—for 10 points—what story by Nathaniel Hawthorne story?
ANSWER: "**Young Goodman Brown**" <MK>

4. **Within these objects in Python 3, enclosure in curly braces signals later modification. These objects are operated on with a "rolling" hash function in the Rabin-Karp algorithm. In one programming tool, the start and end of these objects are signified by a carat and a dollar sign. The "main" method in Java always takes an array of these objects, traditionally assigned the variable name (*)** "args." These objects are immutable in all major languages, and they often use "backslash-n" to signify a newline. They are searched using regular expressions, and two of them are joined in concatenation. Sequences of characters make up—for 10 points—what variable type used to store text?
ANSWER: **string**s <AF>

5. **In a Slavic myth, one of these objects is stolen every night by a mysterious culprit whom the tsar orders hunted down and defeated. Some of these objects are held onto by a group that includes Aegle** [EE-glee]**, Ery·theia** ["airy"-THEE-ah]**, and a hundred-headed dragon. In Greek myth, these objects are used as distractions during a (*)** footrace instigated by Hippo·menes [hih-PAW-muh-neez]. In Latin, the word for one of these objects is nearly homophonous with the word for "evil." In Norse mythology, these objects are guarded by Bragi's wife Idunn.

The Garden of the Hesperides [heh-"SPARE"-ih-deez] is home to "golden" varieties of—for 10 points—what fruit that was awarded to Aphro·dite in the lead-up to the Trojan War?
ANSWER: **apple** [or ***malum***; accept **golden apple**; prompt on fruit before "fruit"] <SPQR>

6. **Second harmonic generation is studied in the "nonlinear" branch of this field of study, which concerns materials in which polarization is not proportional to the electric field. Components in this area of study can be represented as 2-by-2 transfer matrices in the limit of the paraxial approximation. The principle of least (*)** time is useful for plotting trajectories in the "geometric" form of this field. The name of this field is spelled with a "k" in the title of a 1704 treatise that presents the prism experiments performed by its author, Isaac Newton. Diffraction, refraction, and reflection are important topics in—for 10 points—what field that studies properties of light?
ANSWER: **optics** [accept specific nonlinear **optics** or geometric **optics**; accept **light** before "light"; prompt on physics] <SE>

7. **Michael fails to modernize a school in this author's short story "Dead Men's Path." In a novel by this author, a sacred python is almost killed in a village that John Goodcountry converts to Christianity, and where Captain Winterbottom is known as "breaker-of-guns." A character created by this author is guided by his personal god, or *chi*, and gains fame after (*)** wrestling "the cat." In that novel by this man, the protagonist's gun accidentally explodes, causing his family to be exiled for seven years. The protagonist of his first novel breaks the Week of Peace and helps execute his foster son Ikemefuna. For 10 points, name this Nigerian author of *Arrow of God* and *Things Fall Apart*.
ANSWER: Chinua **Achebe** [or Albert Chinualumogu **Achebe**] <MK>

8. **The most recent installment in this film series includes a number of puns on the heroine's work as a "horologist." A character in this series stakes his soul on a game of dice, but is saved when his father matches his wager and then loses. Its second film culminates in a three-way sword fight on a moving water wheel, while its first film includes a duel in a (*)** blacksmith's shop. Based on an amusement park ride, its second film begins with Lord Cutler Beckett of the East India Trading Company arresting Will Turner and Elizabeth Swann. For 10 points, name this series of films like *Dead Man's Chest* and *The Curse of the Black Pearl*, starring Johnny Depp as Captain Jack Sparrow.
ANSWER: ***Pirates of the Caribbean*** <JW>

9. **In the fourth chapter of the novel, this character claims that she and her brother live on a "blighted" star. She then dreams of a "gentlemanly suitor" while driving, accidentally killing the family horse, Prince. This character's wedding is marred by the ominous afternoon crowing of a rooster. She meets her husband while working for Richard Crick at the Talbothay's dairy; that husband later flees (*)** Wessex for Brazil. This sister of Liza-Lu flees to Stonehenge after being raped and becoming pregnant with the child Sorrow. She's executed after stabbing her rapist, Alec. Angel Clare marries—for 10 points—what title descendant of the d'Urbervilles in a Thomas Hardy novel?
ANSWER: **Tess** **Durbeyfield** [accept either name; accept ***Tess of the d'Urbervilles***] <MK>

10. **A piece in this style consists of eleven numbered sections framed by two movements titled "Pulse." This style was used on the album *A Rainbow in Curved Air*. An outgrowth of this style uses tape recordings or multiple performers to make identical music go in and out of phase with itself. This style has been used in "tintinnabular" works like *Spiegel im Spiegel* by (*)** Estonian contemporary composer Arvo Pärt. Exemplified by *Music for 18 Musicians*, it was pioneered by the open-ended piece *In C* by Terry Riley. For 10 points, name this style of music by Steve Reich, John Adams, and Philip Glass, which is extremely repetitive and simplified.
ANSWER: **minimal**ism <JR>

11. **A senator from this state died in a plane crash just before the 2002 elections. In 2008, a Republican senator from this state lost his seat by about 300 votes, or .001% of the vote. A former senator from it ran on a ticket with Geraldine Ferraro after being Jimmy Carter's vice president. This state was represented by Paul Wellstone, Walter (*)** Mondale, and a man who was criticized for a photo taken on a plane during a 2006 USO tour. Leeann Tweeden, among others, accused that former senator from this state of sexual misconduct, leading him to resign in January 2018. Al Franken was a senator from—for 10 points—what Midwestern state?
ANSWER: **Minnesota** <AF>

12. **This opera was the basis for Franz Liszt's *Réminiscences*, and a set of variations on a duet from this opera was ecstatically reviewed by Robert Schumann, catapulting Frédéric Chopin to prominence. An aria from this opera, which was written for Prague, begins with the bass singing "Madamina." This opera's title man sings "Là ci darem la mano"** [LAH chee dah-REM lah MAH-noh] **with Zerlina, and it includes the (*)** "Champagne" and "Catalogue" arias. It opens with the title man trying to rape Donna Anna as Leporello keeps watch. This opera ends with the title character being dragged to hell after the Commendatore's statue comes to life. For 10 points, name this Mozart opera about a Spanish seducer.
ANSWER: ***Don Giovanni*** [prompt on *Don Juan*] <JW>

13. **In I-R spectroscopy, this functional group results in two stretches, including a "bumpy," very wide peak at 3000 to 2500 inverse centimeters. Long hydrocarbons terminating with this functional group react with glycerol to form triglycerides. They're produced by oxidation of (*)** aldehydes. This functional group with an *R* group bonded to one oxygen instead of a hydrogen is called an ester. The simplest molecule with this functional group was discovered in ants and is thus called "formic." For 10 points, name this functional group with formula "C-O-O-H," the most common organic acids.
ANSWER: **carboxylic acid**s [accept **carboxyl** group; prompt on fatty acid] <HK>

14. **An idol in the form of this creature was destroyed by the reforming king Hezekiah and was named *Nehushtan*. Moses had a bronze one of these animals made in order to heal those affected by a plague of "fiery" examples of these animals. A woman in the Torah is told that her child's heel will bruise and be bruised by this creature. After he turned it into one of these animals, (*)** Aaron's rod swallowed other rods belonging to Pharaoh's sorcerers. At the same time as women were cursed with painful childbirths, this animal was cursed to crawl on its belly. For 10 points, name these reptiles associated with Satan, one of which tempted Eve to eat the Forbidden Fruit.
ANSWER: **serpent**s [accept **snake**s, **viper**s, etc.; accept **nahash**; prompt on reptiles before mentioned; prompt on dragons] <MK>

15. **A text named for these things proposes a society of exactly 5,040 male citizens governed by a Nocturnal Council. In an imagined speech, these things point out that Socrates has almost never left Athens, that he is like a child and a servant to these things, and that he can't benefit his children by escaping to Thessaly. Socrates does not appear in a late, 12-book dialogue titled for these things, which was Plato's (*)** longest work. Socrates imagines a speech given by these things in response to Crito's claim that it is just to violate them. For 10 points, name these rules that govern polities like Plato's Republic.
ANSWER: **law**s [or ***nomoi***; or ***nomos***] <JR>

16. **This mountain range is crossed by the 19th-century Barlow Road, which begins at The Dalles. This range is home to fumaroles, mud pots, and a massive lava dome in its Lassen National Park. The semi-arid climate of the Tri-Cities area is caused by this range's rain shadow. This range is formed by the subduction of the (*)** Juan de Fuca Plate. Its Mount Mazama is home to Crater Lake. This range lies east of the Willamette Valley, and

it's cut into by the Columbia River Gorge. Its peaks include Mounts Shasta, Hood, Rainier, and St. Helens. For 10 points, name this volcanic mountain range of the Pacific Northwest.
ANSWER: **Cascade** Range [or "The **Cascades**"] <JR>

17. **This man was forced to watch the execution of his friend Hans Hermann von Katte after they tried to run away together. Inspired by Greeks like Epaminondas, this man made heavy use of a tactic in which one wing is overloaded with troops to win battles like Leuthen** [LOY-tun]**, and established an alliance of Protestant princes known as the *Fürstenbund*. This frequent user of (*)** oblique battle order organized the first partition of Poland and is buried at the Sanssouci [saw-soo-SEE] palace in Potsdam. This music-loving king rejected the Pragmatic Sanction and invaded Silesia to begin the War of the Austrian Succession. For 10 points, name this enlightened despot and "Great" king of Prussia.
ANSWER: **Frederick the Great** [or **Frederick II** of Prussia; or **Friedrich II** or **Friedrich der Grosse**; prompt on Frederick or Friedrich; do not accept or prompt on answers involving "Frederick William" or "Friederich Wilhelm"] <AF>

18. **A 12th-century woman used this language to write a number of narrative poems in the same genre as Chaucer's "Franklin's Tale." In this language, a king's sister was inspired by Boccaccio** [boh-CAH-chyoh] **to write the *Heptameron*. Another used this language to attack the misogyny of books like *The Romance of the Rose* in her *Book of the* (*)** *City of Ladies*. Most lays were written in this language of a poem whose title character is betrayed by Ganelon. The namesake of that poem in this language uses the sword Durendal and bursts his veins blowing a horn during a Muslim ambush at Roncevaux [RON-su-voh] Pass. For 10 points, name this language of *The Song of Roland* and other *chansons de geste* [shawn-sawn du ZHEST].
ANSWER: **French** [or **Français**; accept **Old French** or **Middle French**; accept **Breton** or **Anglo–Norman**] (The two women are Marie de France, Marguerite de Navarre, and Christine de Pizan.) <JR>

19. **In some organisms, the surfaces of these things include huge, empty bulliform cells. The density of these structures is often assessed with a namesake "area index." The inner parts of these structures are often divided into "spongy" and "palisade" layers. The bases of these structures are sometimes covered in stipules. They're covered in a waxy (*)** cuticle and have stomata to allow gas exchange in their mesophyll. The number of these structures in a plant's seeds distinguishes monocots from eudicots. Petioles connect the veins of their blades to their stems. Photosynthesis takes place in—for 10 points—what plant structures that fall off in autumn?
ANSWER: **leaves** [or **leaf**; accept **leaf area index**] <JR>

20. **A leader in this conflict was inspired by the pamphlet "Good Words for Exhorting the Age." During this conflict, over a million Muslims revolted in the Panthay and Dungan Rebellions. In this war, Frederick Townsend Ward put together the Ever Victorious Army, whose leader Charles (*)** Gordon got his nickname fighting in it. Tens of millions of people died in this conflict of the 1850s, in which many regiments of Hakka women helped make Nanjing the capital of a "Heavenly Kingdom of Great Peace." For 10 points, name this rebellion against the Qing [cheeng] dynasty led by Hong Xiuquan [hung SHYOO chwen], who thought he was the younger brother of Jesus.
ANSWER: **Taiping** Rebellion <JW>

Tiebreaker
21. **Silver ions are used to measure the amount of this dissolved ion in argentometry. Cisplatin contains two ammonia ligands and two ligands of this element. Carbon bonded to four atoms of this element was a common NMR solvent before it was banned by the Montréal protocol. It comes in a roughly 3-1 ratio of isotopes with masses (*)** 35 and 37. This element forms an acid found along with nitric acid in aqua regia. Since the element *above* this element doesn't form a strong acid with hydrogen, this element forms the weakest diatomic

strong acid. It has the highest electron affinity and its diatomic form is a pale green gas. For 10 points, name this halogen found with sodium in table salt.
ANSWER: **chlorine** [accept **chloride**; accept **CL**-minus] <AF>

Bonuses

1. Settlers from this country besieged Mafeking and won the first of three battles at Ladysmith. For 10 points each:
[10] Name this home country of the settlers whose language turned into Afrikaans.
ANSWER: Kingdom of the **Netherlands** [or **Nederland**; accept **Dutch**; prompt on Boers]
[10] Those settles, known as Boers, fought two wars with the British in what became *this* country.
ANSWER: Republic of **South Africa** [or Republiek van **Suid-Afrika**; or iRiphabhuliki yase**Ningizimu Afrika**; or iRiphabliki yom**Zantsi Afrika**]
[10] This colony, led by Cecil Rhodes, aided the British in the Boer War. This colony, which became part of the Union of South Africa, conducted the Jameson Raid against the Transvaal when Rhodes was its Prime Minister.
ANSWER: **Cape** Colony <SPQR>

2. For 10 points each—answer the following about polysaccharides found in plants:
[10] In plants, glucose is mainly stockpiled in this generically-named polysaccharide that's found in staple grains like wheat and rice. Humans eat most of their carbohydrates in this form.
ANSWER: **starch**es
[10] Starch actually comprises two distinct types of polysaccharides, which are differentiated by the amount of branching in their structures. Name both.
ANSWER: **amylose** AND **amylopectin** [accept in either order]
[10] The enzyme amylase, which breaks down starches, is found in this substance, which is produced in the parotid and submandibular glands.
ANSWER: **saliva** <JW>

3. A poet of this era espoused a simple, direct style, as opposed to the intricate Latinate style of his rival's collection *The Solitudes*. For 10 points each:
[10] Name this era of a mystical nun best known for her poem "First Dream."
ANSWER: Spanish **Golden Age** [or **Siglo de oro**] (The poets are Francisco de Quevedo and Luís de Góngora)
[10] This Golden Age author, the most prolific in Spanish history, was nicknamed "The Monster of Nature." His over 3,000 works include *Punishment without Revenge* and *Fuente Ovejuna* [FWEN-tay oh-vay-HOO-nah].
ANSWER: Félix Arturo **Lope** de Vega y Carpio
[10] A highlight of the Golden Age was Miguel de Cervantes's novel about *this* man from La Mancha, who fights some windmills and travels with Sancho Panza.
ANSWER: Don **Quixote** [accept Alonso **Quixano**] <MK>

4. Didius Julianus became Roman Emperor for two months after an auction held by this group. For 10 points each:
[10] Name this group whose leaders included Burrus, Aper, and Sejanus.
ANSWER: **Praetorian** Guard
[10] This emperor, who supposedly banned mention of goats because he resembled one, was assassinated by the Praetorian guardsman Cassius Chaerea. This son of Germanicus reigned for only four years, starting in 37 A.D.
ANSWER: **Caligula** [accept **Gaius Julius Caesar Augustus Germanicus**]
[10] Caligula supposedly attempted to make Incitatus, who was *this* kind of animal, a consul. Parthian archers defeated Romans by shooting arrows while riding sitting backward on these animals.
ANSWER: **horse**s <SPQR>

5. A very small number of these people can be found on Sakhalin and the Kuril islands. For 10 points each:
[10] Name this ethnic group largely found on an island with capital Sapporo.
ANSWER: **Ainu**
[10] The Ainu people are primarily native to *this* island, where the 1972 Winter Olympics were held. This second-largest island in Japan is connected to its southern neighbor by the Seikan Tunnel.

ANSWER: **Hokkaido** [or **Yezo**]
[10] Hokkaido's southern neighbor of Honshu is home to *this* city, the center of the most populous metro area in the world and the capital of Japan.
ANSWER: **Tokyo** <MK>

6. The value of the next best alternative is assessed to measure the "opportunity" type of this value that's been lost. For 10 points each:
[10] Give this generic term for the value that has to be spent on producing a good or delivering a service. Prices almost always have to be set above this value, or a company will lose money.
ANSWER: (opportunity) **cost**s
[10] Cost-benefit analyses are often couched in terms of *this* kind of quantity, which measures an incremental change.
ANSWER: **marginal**
[10] For the vast majority of goods, the marginal utility curve almost always has *this* kind of slope. A description is fine.
ANSWER: **negative** [or **down**ward; prompt on diminishing marginal utility] <JR>

7. In Hinduism, this ceremony is followed by the period known as *grihastha*, or being a householder. For 10 points each:
[10] Name this ritual that, in Hinduism, includes the *Kanyadaan* and *Saptapadi* rituals. Many traditional forms of this ritual are preceded by the giving of a dowry.
ANSWER: Hindu **wedding**s [accept **marriage**s]
[10] The *Saptapadi* ritual in a Hindu wedding involves circling one of *these* objects seven times. These objects are traditionally built to commemorate the killing of the demoness Holika.
ANSWER: bon**fire**s [accept **pyre**s; accept reasonable equivalents like **flame**s]
[10] This term, encompassing both the *Saptapadi* and *Holika Dahan,* refers to any Hindu ritual done in the presence of a sacred fire.
ANSWER: *yajna* <AF>

8. René-Just Haüy [aow-EE] codified the fact that these solids always cleave along the same angle. For 10 points each.
[10] Name these highly regular solids composed of a repeating lattice. They're contrasted with amorphous solids.
ANSWER: **crystal**s
[10] The structure of a crystal lattice is modelled as a repeating series of *these* components. For cubic systems, this smallest basic component may be "simple," "face-centered," or "body-centered."
ANSWER: **unit cell**s [or **primitive cell**; or primitive **unit cell**; prompt on partial answer]
[10] Crystal structures can be studied with X-ray crystallography, using Bragg's law. In Bragg's law, interference peaks arise when a multiple of the wavelength equals *what quantity* times the sine of the incident angle theta?
ANSWER: **2d** [or **2** times the **distance** between the planes] <JR>

9. This type of ceramic is distinguished from earthenware and stoneware, which are fired at lower temperatures. For 10 points each:
[10] Name this delicate, translucent type of ceramic, which is often named for China, where it was first produced.
ANSWER: **porcelain**
[10] Two answers required. Imitating Persian models, Chinese ceramics after the year 1000 were often decorated in these *two* colors. Name both.
ANSWER: **blue** AND **white**
[10] The original cobalt blue glazes of Islamic pottery were meant to imitate this rare, deep blue stone, which is mainly found in Afghanistan. This stone was ground up to make the extremely expensive pigment ultramarine.

ANSWER: **lapis** lazuli <JR>

10. This woman was purchased along with Otter Woman as the "wife" of Toussaint Charbonneau. For 10 points each:
[10] Name this Shoshone woman who served as guide and interpreter on the Lewis and Clark expedition.
ANSWER: **Sakakawea** [or **Sacagawea**; accept **Sacajawea**]
[10] Nicholas Biddle popularized the spelling "Sacajawea" in his edition of Lewis and Clark's journals. Biddle directed *this* federal financial institution, which was dismantled by Andrew Jackson.
ANSWER: **Second Bank of the United States** [prompt on just Bank of the United States or National Bank]
[10] Archaeologists have traced parts of Lewis and Clark's path using the concentration of *this* heavy substance in the ground. This substance was taken in the form of calomel to treat syphilis.
ANSWER: **mercury** [or **Hg**] <JR>

11. For 10 points each—answer the following about Sergei Rachmaninoff:
[10] In between sessions for Thomas Edison, Rachmaninoff made many recordings on "rolls" used by this mechanical instrument.
ANSWER: **player piano** [or **pianola**; prompt on partial answer]
[10] Later in his career, Rachmaninoff wrote *Variations on a Theme of Corelli* and *Rhapsody on a Theme of Paganini*. Corelli and Paganini both played this highest string instrument.
ANSWER: **violin**
[10] Along with his Préludes, Rachmaninoff's masterpieces for solo piano are generally considered to be two sets of pieces that combine *this* genre with "tableaus." These pieces form his Opus 33 and 39.
ANSWER: ***Étud**es-tableaux* [or **studies**] <JR>

12. This novel introduced many of the common tropes about pirates, like the peg leg, the parrot on the shoulder, and "X marks the spot." For 10 points each:
[10] Name this novel narrated by Jim Hawkins, in which the harsh Captain Smollett leads a crew on a voyage to the title location.
ANSWER: ***Treasure Island***
[10] The antagonist of *Treasure Island*, Long John Silver, joins the crew in *this* position. Thomas Mugridge has this job in Jack London's *The Sea-Wolf*.
ANSWER: **cook** [accept obvious equivalents; accept **quartermaster**]
[10] *Treasure Island* was written by this Scottish author of *Kidnapped* and *The Strange Case of Dr. Jekyll and Mr. Hyde*.
ANSWER: Robert Louis **Stevenson** <MK>

13. This man voiced a gray wolf in *Penguins of Madagascar*, which is good because his voiceover for a 2009 documentary demonstrated an inexplicable inability to pronounce the word "penguin." For 10 points each.
[10] Name this British actor who plays Sherlock Holmes on a BBC series. He has also played Doctor Strange, and he starred in *The Imitation Game* as Alan Turing.
ANSWER: Benedict (Timothy Carlton) **Cumberbatch**
[10] This character, introduced in the story "A Scandal in Bohemia," is known as the only woman to beat Sherlock Holmes. In the BBC series, this dominatrix sets her phone passcode to S-H-E-R due to her attraction to Sherlock.
ANSWER: **Irene Adler** [accept either name]
[10] In the series, Sherlock continually forgets that this character's first name is Greg despite the fact that he is one of his only three friends.
ANSWER: Detective **Lestrade** [accept Inspector **Lestrade**] <BY>

14. This is the location of Big Mama's funeral in the namesake story. For 10 points each:

[10] Name this town, which made early appearances in the short story "Leaf Storm" and the novel *In Evil Hour*. Its founder loses his sanity and is tied to a chestnut tree by his family.

ANSWER: **Macondo**

[10] This Colombian author of *Love in the Time of Cholera* wrote about Macondo's Buendía family in *One Hundred Years of Solitude*. He died in 2014.

ANSWER: Gabriel **García Márquez** [or Gabriel José de la Concordia **García Márquez**; prompt on Gabo or Gabito]

[10] In *One Hundred Years of Solitude*, Colonel Aureliano Buendía develops a passion for creating lots of these animals. In a 1951 novella, a large one of these animals is brought home by an old fan of the "Great DiMaggio."

ANSWER: golden **fish**es [accept **marlin**s] (The novella is *The Old Man and the Sea*.) <MK>

15. Systems with this property, such as the double pendulum, usually have a positive Lyapunov exponent. For 10 points each:

[10] Name this property of some dynamical systems, whose dependence on small perturbations is sometimes called the "butterfly effect."

ANSWER: **chaos** [or **chaotic** systems]

[10] Chaotic systems are very sensitive to the choices described by this two-word term. For a mass on a spring, two of these choices, one for position and one for velocity, specify the motion of the system.

ANSWER: **initial condition**s [prompt on partial answer]

[10] Chaotic trajectories often do not have this property of returning to their original position after a fixed time. The sine and cosine functions have this property, since they are unchanged when shifted by 2 pi.

ANSWER: **periodic**ity [accept **period**] <SE>

16. For 10 points each—answer the following about properties of bird feathers…in mythology:

[10] These monsters from Greek mythology live in a swamp in Arcadia, where they shoot their metal feathers and poisonous dung at passersby. Eventually, Hephaestus forges a noisy rattle that scares them away.

ANSWER: **Stym·phalian birds** [or ***Stym·phalides ornithes***; or obvious equivalents]

[10] This Norse goddess of love has a cloak of feathers that allows her to shape-shift and to fly at superspeed. Some mythologists have suggested that she and Frigg were once a single goddess.

ANSWER: **Freya** [or **Freyja** or **Freja**; do not accept "Frey" or "Freyr"; do not accept "Frigg" or "Frigga"]

[10] In Egyptian mythology, a dead person's heart is weighed against *this* goddess's feather of truth; heavy hearts are devoured by the cute but deadly monster Ammit.

ANSWER: **Maat** [mah-AHT] [or **Ma'at**] <SPQR>

17. This rule is "undone" via integration by parts. For 10 points each:

[10] Name this formula that gives a common species of derivative as "*f*-prime *g*, plus *f g*-prime."

ANSWER: **product** rule

[10] The product rule was discovered by this German mathematician and philosopher, who also developed the rest of calculus independently of Newton. This man invented the notation "*dy-dx*."

ANSWER: Gottfried Wilhelm von **Leibniz**

[10] You'll have 10 seconds for this bonus part. Using integration by parts, give the integral of "*x e* to the *x*"; since the derivative of *x* is 1, it's probably wise to choose "*x*" to be your "*u*."

ANSWER: $\underline{xe^x - e^x}$ [or "**x** times **e-to-the-x, minus e-to-the-x**"; accept answers that include "**plus C**" at the end]

<JR>

18. This work's central journey was delayed by Hurricane Donna, and began at the author's summer home at Sag Harbor. For 10 points each:
[10] Name this travelogue, which describes the author's journey with a poodle across the United States in a camper nicknamed "Rocinante."
ANSWER: *Travels with Charley: In Search of America*
[10] *Travels with Charley* was written by this Californian author of *The Grapes of Wrath* and *Of Mice and Men*.
ANSWER: John (Ernst) **Steinbeck** Jr.
[10] Steinbeck's Dust Bowl trilogy begins with *In Dubious Battle*, which centers on Communists organizing one of these events. Clifford Odets' *Waiting for Lefty* is about taxi drivers organizing in one of these events.
ANSWER: a labour **strike** <MK>

19. This civilization produced a basalt statuette dubbed *The Wrestler* sometime between 1500 and 400 BC. For 10 points each:
[10] Name this oldest of the major Mesoamerican civilizations, known for producing massive stone sculptures known as "colossal heads."
ANSWER: **Olmec**s
[10] The Olmecs are also known for making face masks out of this green rock, which was often used to carve miniature dragons, rings, belt ornaments, and other objects in China.
ANSWER: **jade** [or **yu**]
[10] The Olmecs were also known for making *this* kind of sculpture, used for the majority of Assyrian sculpture. This kind of sculpture is made using relatively shallow cuts into a flat surface.
ANSWER: **bas-relief** [or **low relief**; prompt on partial answer] <JR>

20. A history of these people was written by Paul the Deacon. For 10 points each:
[10] Name this early Medieval Germanic people, whose kings included Alboin and Liutprand. They founded the Duchies of Spoleto and Benevento.
ANSWER: **Lombard**s [accept **Langobard**s]
[10] Lombard had conquered northern Italy from the "eastern" or "Ostro-" branch of these Germanic people, whose western or "Visi-" branch ruled Spain until the Muslim conquest.
ANSWER: **Goth**s [accept **Visigoth**s or **Ostrogoth**s]
[10] This "Great" king founded the Ostrogothic kingdom of Italy. He supposedly killed Odoacer, the man who overthrew the last Western Roman Emperor, with his bare hands.
ANSWER: **Theodoric** the Great <JR>

Tiebreaker
21. This king approved the missions of Francisco Pizarro and Hernán Cortés, appointing the latter governor of New Spain. For 10 points each:
[10] Name this king of Spain who retired to a monastery in the 1550s. He passed rule of Spain and the Netherlands to his son, and his other territories to his brother Ferdinand I.
ANSWER: Holy Roman Emperor **Charles V** [or **Karl V**; or **Carolus V**; or **Charles I** of Spain or **Carlos I**; prompt on just Charles, Karl, Carolus, or Carlos]
[10] Charles V was king of Spain because his father Philip had married Joanna "the Mad," the daughter of these *two* Catholic Monarchs of Spain. This king and queen kicked the Jews out of Spain in 1492.
ANSWER: **Ferdinand** II of Aragon [or **Ferrando** II or **Fernando** II] AND **Isabel**la I of Castile
[10] Just like the Hapsburgs, the Catholic Monarchs were badly inbred, since both were members of *this* royal house, which followed from the House of Ivrea.
ANSWER: House of **Trastámara** <JR>