

IMSANITY

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Tossups

- (1) This man's *Essays on Philosophical Subjects* was published posthumously, despite his request to destroy his manuscripts upon his death. In his first published book, he argued that context is required to sympathize with interpersonal emotions like anger, but that people naturally experience sympathy when they observe intrapersonal emotions like joy and grief. That work was the outgrowth of lectures he gave as the Chair of * Moral Philosophy at the University of Glasgow, and first introduced his concept of "the invisible hand". FTP, name this Scottish author of *The Theory of Moral Sentiments*.

ANSWER: Adam Smith

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- (2) In 2008, a Google Book of this mathematician's lost work was released after it was recovered from a medieval palimpsest. This man's namesake property states that for any two positive real numbers x and y , some multiple of x is larger than y . Although he did not discover the law of the lever, he was the first to prove it rigorously in his *On the Equilibrium of Planes*. He computed the area of a parabolic segment using the method of * exhaustion, which he also used to compute π to two decimal places of accuracy. The semiregular solids are named for, FTP, this ancient Greek famous for his "Eureka!" moment.

ANSWER: Archimedes of Syracuse

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- (3) In this work, the protagonist learns that Benjamin Franklin was the first man to have the protagonist's job in Stoneman and Black's rulebook. One character compares humans to phoenixes, always burning themselves up. In this work, * Mrs. Phelps cries when she hears a reading of "Dover Beach". This work's author claims that it is about the dangers of television, although it is often associated with criticism of censorship. Early in the book, the protagonist meets Clarisse McLellan, a quirky girl who changes the protagonist's outlook on the world. FTP, name this book in which Guy Montag is a fireman who burns books, a novel by Ray Bradbury.

ANSWER: Fahrenheit 451

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- (4) **Its objects are electron degenerate, and the most common subtype of those objects occupies its center. Cepheid variables occupy the instability strip in this, and Arthur Eddington wrote a book on it in 1926. It was first presented to the Royal * Astronomical Society in 1912, and this is used in conjunction with the Kelvin-Helmholtz mechanism to incorrectly predict the age of the sun. A gap in it is located between the A5 and G0 spectral types, and White Dwarfs are found in the lower left while Supergiants are found in the top right. The main sequence stretches across, FTP, this scatter plot which compares a star's luminosity against its temperature.**

ANSWER: Hertzsprung- Russell Diagram

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- (5) **This team drafted Sam Bowie second overall in the 1984 draft, allowing the Bulls to take Michael Jordan third. After joining the NBA in 1970, this team experienced six consecutive losing seasons before winning the NBA Championship the following year under the leadership of Bill * Walton. It has since reached the NBA Finals twice, losing to the Pistons and Bulls, respectively. This team retired number 22 in honor of Clyde Drexler, and with the first overall pick in the 2007 draft, this team took injury-plagued center Greg Oden. FTP, name this team owned by Paul Allen which plays its home games in the Rose Garden Arena.**

ANSWER: Portland Trail Blazers (accept either underlined part)

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- (6) **In this work, the protagonist goes to see a production of Hamlet in which the king has a cough and consults his script while performing. At the end of one chapter, the protagonist reveals that something important is about to happen to him, but before telling about it, he will devote a chapter to the woman he loves. One character in this novel is * Wemmick, a lawyer who is obsessed with personal property. Wemmick is the assistant to Jaggers, who takes the protagonist to live with Herbert Pocket. The protagonist discovers that he had met Herbert as a child at Satis House where he would go to play with Estella at the request of Miss Havisham. FTP, name this work by Charles Dickens about the life of Philip Pirrip, often called Pip.**

ANSWER: Great Expectations

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- (7) This event inspired the documentary *Quiet Rage* as well as the German film *Das Experiment*, and it supported the idea that human behaviors are less influenced by internal factors like personality than by external factors like situation and role. Participants in the event were gathered by the police department of * Palo Alto and transported to the basement of Jordan Hall. Once there, a group of twelve men, including “John Wayne”, held authority over another group of twelve, and quickly became abusive. Being called off less than halfway through its duration due to safety concerns, FTP, name this 1971 study by Philip Zimbardo, a psychologist at its namesake university.

ANSWER: Stanford prison experiment (accept Zimbardo experiment before his name is mentioned)

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- (8) This organelle contains the protein thermogenin in its lipid bilayer, which assists in generating heat. Leigh’s disease affects this organelle’s ability to function properly, sometimes due to a deficiency of the enzyme pyruvate dehydrogenase. Its namesake matrix is the site of the conversion of malate to oxaloacetate, which produces a molecule of NADH, a step in the * Krebs Cycle. Proposed to have originated in eukaryotic cells by the endosymbiotic theory, this cell contains its own circular DNA. This ceullular organelle contains cristae and is the site of the electron transport chain. FTP, name this organelle that produces large amounts of ATP, the powerhouse of the cell.

ANSWER: mitochondria or mitochondrion

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- (9) In his Memoirs, the composer revealed that he originally dedicated this piece to the actress Harriet Smithson, with whom he had become infatuated. The program begins with an artist falling desperately in love, and he starts to always hear a melody in his head upon seeing his loved one. This peculiarity greatly troubles him after a brilliant waltz makes his heart pound. In despair he poisons himself with opium and induces a hallucination in which he believes he has murdered his beloved. Condemned to death, he witnesses his own execution upon a * “March to the Scaffold” before violently awakening from his dream. FTP, name this landmark piece of Romantic program music written by Hector Berlioz.

ANSWER: Symphonie fantastique, Op. 14

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- (10) **The freed slave Sakura seized the throne of this empire and conquered Tekrur and Dyolof. This empire's founder defeated the Sosso confederation at the battle of Kirina, in addition to conquering Audaghost and Wangara. Another ruler of this empire came to power after his predecessor Abubakari II disappeared with an expedition across the * Atlantic Ocean. That ruler accidentally destroyed the Egyptian economy during his hajj when his generous spending led to an influx of gold. This empire founded by Sundiata was succeeded by the Songhai Empire. FTP, name this African empire with capital at Timbuktu whose rulers included Mansa Musa.**

ANSWER: Mali

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- (11) **A fixed point of a function is an intersection of its graph with this entity, which is the best linear approximation to y equals sine of x around x equals zero. Multiplying the graph of a function by the matrix with first row 0 1 and second row 1 0 reflects across it, which produces the * graph of the function's inverse, and a function composed with its inverse yields this curve. Having one intercept and making a 45 degree angle with the positive x axis, FTP, name this line with a slope of one and passing through the origin.**

ANSWER: The line $y = x$ or $f(x) = x$ [f of x equals x] (prompt on "X")

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- (12) **It ends with a description of the protagonist with a calm expression and lying face forward "as though sleeping." The first to lose virginity in the protagonist's class is Leer, and Joseph Behm is the first to die. One character's boots are taken after his death; that character is Kemmerich, a student of * Kantorek. The protagonist feels remorse and realizes they are all "victims of war" after stabbing a French soldier named Gerard Duval. After carrying his friend to a dressing station, the protagonist realizes shell fragments have killed Katczinsky. FTP, name this anti-war novel set during World War I about Paul Baumer, written by Erich Maria Remarque.**

ANSWER: All Quiet on the Western Front or Im Westen nichts Neues

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- (13) **Willy Lott owned the house depicted on the far left side of this painting. On the far right of this painting, a man is located in the bushes next to a boat at the edge of the water. On the left side of the river Stour, a small dog looks on at two men as they attempt to direct** * several black animals pulling a wagon through shallow water. Met with indifference in the artist's native England, this painting was celebrated in France, and inspired the Barbizon school. FTP, name this masterpiece created by John Constable.

ANSWER: The Hay Wain

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- (14) **While this curve is not sinusoidal, its height is proportional to its arclength, causing it to obey simple harmonic motion, and Christiaan Huygens used this isochronous curve to design a more accurate pendulum clock. As shown by Newton and Bernoulli, it is also a solution to the** * brachistochrone problem, as a frictionless object accelerated only by gravity will travel between its endpoints faster than along any other curve. Described with the parametric equations x equals $r t$ minus r sine t and y equals r minus r cosine t , FTP, identify this curve swept out by a point on a circle rolling along a line.

ANSWER: cycloid

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- (15) **He used a version of John Oxenford's *A Day Well Spent* in a work about a businessman named Horace Vandergelder looking for a wife titled *The Merchant of Yonkers*. He wrote a "fantasia...of the last days of the Roman republic", tracing similarities between Mussolini and Caesar in *The* * *Ides of March*. He used the Antrobus family to represent the onset of the Ice Age and the Great Flood in *The Skin of Our Teeth*. In another work, the titular structure collapses in Peru, killing Esteban, Marquesa, and Uncle Pio. FTP, name this author of *The Bridge of San Luis Rey* who wrote a play narrated by a Stage Manager, *Our Town*.**

ANSWER: Thornton Wilder

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- (16) **This president's controversial opposition to an entity led by Nicholas Biddle was assisted by his secretary of the treasury, Roger B. Taney. Another one of this president's actions, supported by Thomas Hart Benton, required payment for government land to be in gold or silver. In addition to issuing the * Specie Circular and destroying the Second Bank of the United States, this president's pledge to send troops to South Carolina led to the end of the Nullification crisis. He signed the Indian Removal Act, leading to the Trail of Tears. FTP, name this US President from who served from 1829 to 1837, nicknamed "Old Hickory" after his victory at the Battle of New Orleans.**

ANSWER: Andrew Jackson

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- (17) **This man discovered that corrugated cardboard could be layered, becoming strong enough to become suitable for use as furniture. Out of this discovery arose his *Easy Edges* furniture designs. He designed a giant sculpture of a fish which sits in a public garden in front of the Fishdance Restaurant in Kobe, Japan. Due to leaks, cracks in masonry, and mold problems in his Ray and Maria Stata center, * this architect was sued by MIT. He is most famous for his works covered with titanium, such as the Weisman Museum and Dancing House in Prague. FTP, name this architect who also designed the Walt Disney Concert Hall, Experience Music Project in Seattle, and the Guggenheim Museum in Bilbao, Spain.**

ANSWER: Frank Gehry

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- (18) **When in liquid ammonia, lithium or this element and an alcohol provide electrons for the reaction mechanism of Birch reduction. Its carbonate is used to convert bauxite into alumina in the Deville process, and in stars, it is formed by the fusion of two carbon atoms. This element can be produced by electrolysis of its hydroxide, called * lye, in the Castner process. Three of its ions are transported out while two potassium ions go in across the plasma membrane in its namesake "potassium pump." This element burns bright yellow in the flame test, and its bicarbonate is baking soda. FTP, name this alkali metal with atomic number 11 and symbol Na.**

ANSWER: sodium (accept Na before it is mentioned)

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- (19) This case overturned a 1942 decision in which the majority opinion declared that the absence of counsel did not necessarily constitute a breach of justice. Both associate justices who heard both cases, Hugo Black and William O. Douglas, dissented in the former, *Betts v. Brady*, and held their position in this later unanimous decision. This ruling asserted that states must abide by the Fourteenth Amendment. In the wake of this decision, the plaintiff was released from his Florida prison cell after having been convicted of * breaking into a pool hall to steal money and beverages. FTP, name this landmark 1963 Supreme Court case that affirmed an indigent defendant's right to an attorney.

ANSWER: Gideon v. Wainwright

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- (20) The Bragg form of this phenomenon utilizes three-dimensional periodic structure crystals, while another variety of this phenomenon occurs due to the far-field location of observation, causing outgoing waves to be planar, named for Fraunhofer. For near-field observation, this process is named for Fresnel.* This phenomenon was used in an experiment displaying the wave and particle nature of light, Young's double-slit experiment. Generated by its namesake grating, FTP, name this phenomenon in which a wave bends around small obstacles or spreads out when passing through small openings.

ANSWER: diffraction

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- (21) This figure beheaded his father-in-law, but restored life by replacing the severed head with that of a goat. He also earned the alternate name Neelakantha after swallowing poisonous hala-hala as the devas attempted to procure the nectar of immortality. This deity offered a mystical axe to Parashurama, and at his residence on Mount Kailasa he beheaded his son, but at the pleading of his wife * Parvati revived him with the head of an elephant and named him Ganesh. FTP, the Ganges River flows from the hair of this Hindu God represented by the lingam who is often known in the Hindu trinity as the destroyer.

ANSWER: Shiva or Siva

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Bonuses

(1) Answer the following questions about a work of British literature FTPE:

[10] This Victorian novel follows the life of the titular character as she is abused by her uncle's family, the Reeds, goes to The Lowood Institution, becomes a governess, and falls in love with her employer.

ANSWER: Jane Eyre

[10] This author of *Jane Eyre* also wrote *The Green Dwarf* and *The Professor*, the latter of which was published posthumously.

ANSWER: Charlotte Brontë

[10] This man is the employer and eventual husband of Jane Eyre. He is tricked into marrying a madwoman.

ANSWER: Edward Fairfax Rochester (accept either underlined part)

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(2) Answer the following about African islands FTPE:

[10] This group of Spanish islands is located about 60 miles west of the Moroccan coast. Their name is derived from Latin for "Island of the dogs".

ANSWER: Canary Islands or Islas Canarias

[10] This island in the Indian Ocean is the fourth-largest island in the world as well as the largest island nation.

ANSWER: Madagascar

[10] In *Long Walk to Freedom*, Nelson Mandela recounts the 27 years he spent as a political prisoner on this South African island.

ANSWER: Robben Island

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(3) This New York Skyscraper is located at 375 Park Avenue and contains the Four Seasons restaurant. FTPE:

[10] Name this building whose blinds only have three settings to promote uniformity in the appearance.

ANSWER: Seagram Building

[10] This architect of the Seagram Building collaborated with Philip Johnson in its production. He is famous for his glass and steel structures, shown in his design of the Farnsworth House.

ANSWER: Ludwig Mies van der Rohe

[10] Mies van der Rohe's work is representative of this style of architecture, stressing rectilinear forms and planar surfaces stripped of ornamentation. Often, glass and steel were used as construction materials, as well as concrete.

ANSWER: International Style

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(4) This genetic disorder occurs due to the trinucleotide repeat of CAG. FTPE:

[10] Name this autosomal dominant neurodegenerative disorder. Symptoms include jerky movements called chorea.

ANSWER: Huntington's disease (also accept "Huntington's chorea" or "Huntington's disorder")

[10] The HTT gene, which is mutated in Huntington's disease, is located on the short arm of this chromosome.

ANSWER: 4

[10] Due to this effect, the presence of Huntington's disease is higher in areas such as South Africa. It is defined as the loss of genetic variation due to the establishment of a new population by a small number of individuals.

ANSWER: Founder effect

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(5) Answer these questions about a pair of rivals in the Thirty Years' War FTPE:

[10] This King began the Golden Age of Sweden and intervened in the Thirty Years' War on the side of the Protestants. He is considered one of the greatest generals of all time for the flexibility and training of his soldiers and early forms of combined arms and field artillery.

ANSWER: Gustavus Adolphus the Great or Gustav II Adolf

[10] One of the two main Imperial commanders during the Thirty Years' War, this Flemish mercenary fought against Bohemian rebels and Fredrick V of the Palatinate early in the war. He destroyed the city of Magdeburg while scavenging for supplies and was mortally wounded at the Battle of Rain am Lech.

ANSWER: Tilly or Johann Tserclaes, Count of Tilly

[10] Tilly lost this key battle to Gustavus Adolphus, where the Imperial army was surrounded after their cavalry was defeated and the army was completely annihilated. In addition to capturing Saxony for the Protestants, this convinced many Protestants to join the war and France to give greater support.

ANSWER: Battle of Breitenfeld

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(6) After the death of a woman, the "wenches" go to the funeral "in such dress/As they are used to wear". The speaker comments on how the dead woman's "horny feet" show "how cold she is, and dumb". FTPE:

[10] Name this poem which states that "the only emperor is" this titular figure.

ANSWER: The Emperor of Ice Cream

[10] "The Emperor of Ice Cream" is a poem by this American Modernist poet who also penned "The Idea of Order at Key West" and "The Man with the Blue Guitar."

ANSWER: Wallace Stevens

[10] "Thirteen Ways of Looking at a Blackbird", "Anecdote of the Jar," as well as "The Emperor of Ice Cream" are part of this 85-poem collection by Wallace Stevens.

ANSWER: Harmonium

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(7) They come in the flavors up, down, top, bottom, charm, and strange. FTPE:

[10] Name these fundamental particles with fractional electric charge, which group together to form hadrons.

ANSWER: quarks

[10] This class of fundamental particles includes muons and neutrinos. Like quarks, they have a spin of one-half, but unlike quarks, they have integer charge.

ANSWER: leptons

[10] In contrast to quarks, leptons are not affected by this fundamental force.

ANSWER: strong nuclear force or strong interaction or color force

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(8) Joyce Carol Oates described his vocals as “frankly nasal, as if sandpaper could sing”. FTPE:

[10] Name this American folk singer who famously asked “How many roads must a man walk down, before you call him a man?” in his 1963 hit “Blowin’ in the Wind”.

ANSWER: Bob Dylan or Robert Allan Zimmermann

[10] Bob Dylan’s stage name was inspired by this 20th century Welsh poet, whose works include *Under Milk Wood* and “Do Not Go Gentle Into That Good Night”.

ANSWER: Dylan Thomas

[10] This Bob Dylan song, whose cover by The Byrds reached #1 on the Billboard charts in June 1965, tells the title figure that “in the jingle-jangle morning I’ll come followin’ you”.

ANSWER: Mr. Tambourine Man

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(9) Name these menacing mythological creatures FTPE:

[10] In Egyptian lore, the dark god Apep often battles Ra under the guise of this animal, which is also known in Greek mythology for acting as the hair of Medusa.

ANSWER: Snake

[10] According to Japanese tradition, the fork-tailed bakeneko is a monster version of this animal which had the ability to take the form of a person they are attempting to harm. In Norse mythology, Freya employs two of them to pull her chariot.

ANSWER: Cat

[10] This Native American trickster once stood as a replacement for the moon in order to spy on other deities.

ANSWER: Coyote

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(10) Identify the following methods to compute limits in calculus FTPE:

[10] When a limit is of an indeterminate form, such as zero divided by zero, this rule, named for a French marquis, can be applied to compute its value.

ANSWER: L'Hôpital's Rule or Law or Theorem

[10] This law states that if f of x is bounded between two functions having the limit L , then the limit of f of x is L as well.

ANSWER: Squeeze or Sandwich Rule or Law or Theorem or Principle

[10] When all else fails, limits can be computed using the formal definition, stated in terms of these two Greek letters, each representing a small positive quantity.

ANSWER: delta and epsilon

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(11) More people have probably heard his music coming from a cell phone than in a concert hall. FTPE, answer the following about the Red Priest:

[10] Identify this Italian Baroque composer of religious choral works, over 40 operas, and over 500 concertos, the most famous of which are *The Four Seasons*.

ANSWER: Antonio Lucio Vivaldi

[10] Of Vivaldi's more than 500 concertos, 230 are solo ones written for this instrument. Vivaldi also served as a teacher of this instrument for a Venetian orphanage at the beginning of his career.

ANSWER: violin

[10] Vivaldi found resounding success across Europe with this collection of twelve concertos for one, two, and four violins. It is sometimes labeled as a set of concerti grossi because of how it also features solo cello.

ANSWER: L'estro Armonico

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(12) Identify the following about a chemical group FTPE:

[10] This group of elements contains the most electronegative element. In nature, many of them are found as diatomic molecules, such as bromine gas.

ANSWER: halogens

[10] This family of f-block elements contains uranium and plutonium. They are all radioactive and include the elements with atomic numbers between 89 and 103.

ANSWER: actinide or actinoid

[10] This group includes scandium, yttrium, and the fifteen lanthanides. Many of these elements trace their names to a mine in Ytterby, Sweden.

ANSWER: Rare Earth Metal or Rare Earth Element

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(13) Answer the following about the theory of planar graphs FTPE:

[10] A graph is called planar if it can be drawn in the plane so that no two edges do this.

ANSWER: cross (accept clear knowledge equivalents)

[10] In a planar graph, the number of edges plus two is equal to the number of vertices plus the number of these structures.

ANSWER: faces

[10] According to a famous theorem of Appel and Haken, this is the maximum number of colors needed to properly color a planar graph.

ANSWER: four

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(14) Name some psychological complexes FTPE:

[10] This complex, named after an ancient Greek tragic hero, involves a boy's unusual attraction to his mother.

ANSWER: Oedipus complex

[10] This inferiority complex, named for a historical general, describes how men overcompensate for being very short.

ANSWER: Napoleon complex

[10] Describing the condition in which people believe they can see the future, this complex is named for this figure from Greek mythology who had the gift of prophecy, but no one believed her.

ANSWER: Cassandra complex

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(15) Jean Baptiste Perrin determined the value of this constant by using Brownian motion, while modern methods use X-ray diffraction to calculate this. FTPE:

[10] Name this constant, the number of atoms in 12 grams of carbon-12, roughly equal to 6.022 times ten to the twenty-third power.

ANSWER: Avogadro's number or constant (prompt on "one mole" and "little *n*")

[10] This constant is equal to the ideal gas constant multiplied by Avogadro's number, and holds the same units as entropy, Joules per Kelvin.

ANSWER: Boltzmann constant

[10] This constant is defined as the number of ideal gas particles at a given volume at STP, and is equal to the pressure divided by the product of the Boltzmann constant and temperature. It is named for the German who first approximated Avogadro's number.

ANSWER: Loschmidt constant

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(16) Its upper right contains a man with a sickle walking towards an upside-down woman. FTPE:
 [10] Name this painting whose most prominent features are a sheep's head on the left, and green man's head on the right, and a tree in the lower half. Its overlapping images represent the artist's hometown.

ANSWER: I and the Village

[10] *I and the Village* is a work by this French painter known for his depictions of Jewish tradition in works such as *The Praying Jew* and *The Creation of Man*.

ANSWER: Marc Chagall

[10] This other Chagall painting depicts himself painting a goat, although with a rather anomalous left hand.

ANSWER: Self-Portrait with Seven Fingers

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(17) Name these signers of the Declaration of Independence FTPE:

[10] It is often speculated that this shipping magnate and first Governor of Massachusetts made his signature so large so that King George III could read it without his spectacles on.

ANSWER: John Hancock

[10] This Delaware Congressman was a delegate on the Stamp Act Congress. His famous 80-mile ride to Philadelphia to assure Delaware's participation in voting on independence was immortalized on Delaware's state quarter.

ANSWER: Caesar Rodney

[10] This Maryland signatory was appointed by Washington as a Supreme Court Justice. A strong Federalist, Thomas Jefferson led efforts to impeach him over his alleged misconduct and political bias.

ANSWER: Samuel Chase

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(18) In one of his plays, the Smiths visit the Martins, and many characters are named Bobby Watson. FTPE:

[10] Name this French Romanian absurdist playwright of *The Bald Soprano*.

ANSWER: Eugene Ionesco

[10] In Ionesco's play *Rhinoceros*, all characters except this one turn into the eponymous pachyderm.

ANSWER: Berenger

[10] In this Ionesco play, an old man and an old woman prepare the titular objects for imaginary guests.

ANSWER: The Chairs or Les Chaises

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(19) Data structures are used in computer science to store and retrieve information. Identify these data structures FTPE:

[10] This linear data structure identifies its elements with the integers from 0 to its length minus 1. It is built into every major programming language, and comes in an associative type.

ANSWER: array

[10] This last-in-first-out structure makes use of the push and pop methods to add and remove items.

ANSWER: stack

[10] Stacks can be implemented as special cases of this data structure, in which each node contains a reference to the next one. They are built in to the LISP language, where the references are called “cdr”s [cudders].

ANSWER: linked list

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(20) This poem ends by asking “Let bodies cling like magnets to my body/Come quickly to my veins and to my mouth/Speak through my speech, and through my blood”, after starting with the speaker comparing himself to an “empty net” moving from “the air to the air.” FTPE:

[10] Name this poem which features the speaker climbing “the ladder of the earth” to the title location, an “iceman of Andean tears”.

ANSWER: The Heights of Macchu Picchu or Alturas de Macchu Picchu

[10] This collection of poems such as “Let the Woodcutter Awaken”, “A Lamp on Earth”, and “The Conquistadores” also includes “The Heights of Macchu Picchu”.

ANSWER: Canto General

[10] This Chilean poet who wrote *Canto General* also wrote that “Perhaps not to be is to be without your being” and “I can write the saddest lines tonight” in his other poetry collection, *Twenty Love Poems and a Song of Despair*.

ANSWER: Pablo Neruda

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(21) Identify the following about the man called Doctor Mirabilis FTPE:

[10] This friar and English philosopher wrote his *Opus Majus* at the request of Pope Clement IV.

ANSWER: Roger Bacon

[10] Roger Bacon was one of the first European philosophers to recall the works of this man, the teacher of Alexander the Great who advocated the theory that matter consisted of five elements.

ANSWER: Aristotle

[10] Aristotle was a major influence in Bacon’s development of the modern version of this set of techniques for attaining knowledge.

ANSWER: scientific method

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