1. This country's six classical schools of philosophy include those devoted to enumeration, atomism, and logic. Kautilya authored a Machiavellian tract on government for a ruler from this modern-day country. In *The World as Will and Representation,* Schopenhauer borrowed ancient ascetic philosophy from this country. Satyagraha originated from this country. For 10 points, name this country where the Vedas are an ancient work of Hindu philosophy.
ANSWER: **India**

190-13-90-07101

2. This structure is made up of coordinate glycosphingolipids and proteins called lipid rafts. Integral proteins span this structure, which mostly consists of amphipathic molecules with polar head groups and fatty acid tails. The fluid mosaic model explains the fluidity of this structure, though cholesterol in it adds rigidity. For 10 points, name this semipermeable structure made up of a phospholipid bilayer surrounding cells.
ANSWER: cell **membrane** [or plasma **membrane**]

190-13-90-07102

3. This character's arrival, dressed as the Red Death, to announce the completion of his opera *Don Juan Triumpant* marks the transition to "Why so silent?" from "Masquerade." This character is jealous of Raoul, the love interest of a Swede whom he trained to sing "Think of Me" and whom he serenades in "The Music of the Night." For 10 points, name this Andrew Lloyd-Webber musical character who loves Christine, a Paris opera house.
ANSWER: The **Phantom** of the Opera [or **Erik**; or the **Opera Ghost**; or the **Angel of Music**]

153-13-90-07103

4. The title character of one of this author's poems scorns Harold Wilson for studying Latin "like the violin" and says he has "come to ditch the meadows." That poem concludes with Warren telling Mary that Silas has died. This author of "The Death of the Hired Man" described a time "in a yellow wood" where he chose the path "less traveled by, and that has made all the difference." For 10 points, name this poet of "The Road Not Taken."
ANSWER: Robert **Frost**

121-13-90-07104

5. A "legal" form of this language is used for contracts on an island home to the Jerriais language. It was once spoken in the Missouri Ozarks, whose name comes from this language. This language's word for "yes" once distinguished it from the southern Occitan language. Although not Germanic, this language uses a guttural R sound. This language's counting system is based on the number twenty, and its dialects include Acadian, Belgian, and Swiss. For 10 points, name this language spoken in Quebec.
ANSWER: **French** [or **francais**]

232-13-90-07105

6. These actions were frequently performed by the 1983 "Fun Bunch" and by rookie star Ickey Woods. Terrell Owens once used a sharpie when performing it, and State Farm commercials have highlighted Aaron Rodgers' "Discount Double Check" move in doing it. These actions can result in flags for excessive celebrations, although that does not affect the Lambeau Leap performed by Green Bay Packers players. For 10 points, name this action frequently involving dancing by players who score in football.
ANSWER: **touchdown celebration**s [or **endzone dance**s; or obvious equivalents that include **touchdown**]

7. The complex version of this quantity is related to the square roots of the complex dielectric constants, and the Lorentz-Lorenz equation gives this value for a dilute gas. This quantity is often measured at the wavelength of the sodium D-line. For 10 points, identify this optical quantity which relates the speed of light in a medium to its speed in a vacuum, changes in which cause light to bend.
ANSWER: **index of refraction** [or **refractive index**; prompt on "refraction" or word forms; prompt on "n"]

8. Thiourea catalysts rely on these phenomena, which allows hydrogen fluoride to form hexamers and carboxylic acids to form dimers in solution. They occur between the ith and I plus 4th residues of a standard alpha helix, and two of these are present between an AT-pair in DNA, while 3 of them are present between a GC pair. These phenomena require an electronegative donor atom to give up an atom of a certain element. For 10 points, name this weak type of interaction formed by a bridge of the lightest element.
ANSWER: **hydrogen bond**

9. This man wrote a series of interconnected stories called *The Illustrated Man*, and in one of his works, the Hadley children murder their parents with lions in a three dimensional television nursery. This author of "The Veldt" wrote a story about how Eckles' killing a butterfly altered history as well as a novel in which the fireman Guy Montag attempts to escape the mechnical hound. For 10 points, name this author of "A Sound of Thunder" and *Farenheit 451*.
ANSWER: Ray **Bradbury**

10. This character's illiteracy and small feet are clues of his innocence in an episode where he is framed for armed robbery. His career was briefly threatened by the popularity of the ventriloquist dummy Gabbo. In an episode parodying *The Jazz Singer,* it is revealed his father is a rabbi who has disowned him. Sideshow Mel works on his TV show, which also shows the Itchy and Scratchy cartoon. For 10 points, name this entertainer whose show is watched by Bart and Lisa Simpson.
ANSWER: **Krusty** the Clown [or Herschel **Krustofsky**]

11. In this novel, Tommy Dukes proposes that civilization will be saved by "the democracy of touch." Mrs. Bolton cares for a man who becomes obsessed with coal-mining in this novel. Taking place around the estate of Wragby, its protagonist sleeps with Michaelis and makes love to a gamekeeper on the forest floor. This novel's protagonist's husband is a paralyzed intellectual. For 10 points, name this novel about Connie's affair with Oliver Mellors, by D.H. Lawrence.
ANSWER: *Lady Chatterley's Lover*

12. A man who held this title built a palace that effectively founded the Croatian city of Split. Another man who held it said "Oh, I think I'm becoming a god" as he dies. Two men who held it fought at the Battle of the Milvian Bridge. The institution of the Tetrarchy meant four men effectively held this title. Suetonius wrote a biography of the first eleven men to hold it. In 69 CE, four men, including Galba and Vespasian, held this title. For 10 points, name this title first held by Augustus Caesar.
ANSWER: **Roman emperor**

052-13-90-07112

13. This composer wrote the second movement of one of his piano concertos with the soprano Constantia Gladkowska in mind. A waltz written by this composer was inspired by the sight of George Sand's dog chasing its tail. This composer of the "Minute Waltz" created a piece in which the right hand only plays black keys, and he wrote nearly seventy mazurkas. For 10 points, name this Polish-born French composer who created the "Black Key" and "Revolutionary" etudes.
ANSWER: Frederic Francois **Chopin** [or Fryderyk Franciszek **Szopen**]

023-13-90-07113

14. This process is accompanied by the secretion of the antimicrobial protein dermcidin. A common test for cystic fibrosis involves inducing this process. The product of this process includes pheromones when it occurs from apocrine glands, but not from eccrine glands. Heat stroke is often caused when this regulatory mechanism shuts down, preventing its evaporative cooling mechanism. For 10 points, name this process by which the skin secretes salt water.
ANSWER: **perspiration** [or word forms; or **sweat**ing or word forms]

190-13-90-07114

15. Numbers in this set can be found by taking powers of the matrix with rows 1, 1 and 1, 0, or more explicitly with Binet's formula. The Lucas numbers have the same recurrence relation as this sequence, which is why the ratio of its terms also tends to the golden ratio. Leonardo of Pisa derived this sequence by considering a set of rabbits which mated with each other each month. For 10 points, identify this sequence starting 1, 1, 2, 3, 5, in which each term is the sum of the previous two.
ANSWER: **Fibonacci** numbers [or **Fibonacci** sequence]

233-13-90-07115

1A. What simple sorting algorithm swaps adjacent items if they are out of order?
ANSWER: **bubble** sort

1B. What Ayn Rand-inspired underwater city is inhabited by Big Daddies and serves as the setting of *Bioshock*?
ANSWER: **Rapture**

2A. What cult leader set up a namesake town in Guyana and ordered his followers to commit mass suicide via poisoned Kool-Aid?
ANSWER: Jim **Jones**

2B. What operon found in *E. coli* is used to metabolize the sugar found in milk?
ANSWER: **lac** operon

3A. This is a 20-second calculation question. Sphere A has a volume 64 times that of sphere B. What is the ratio of the radius of Sphere A to that of Sphere B?
ANSWER: **4** [or **4** to 1]

3B. This is a 20-second calculation question. If every member of the United States Senate casts a vote at random, with a 60% chance of voting Aye and a 40% chance of voting Nay, what is the probability of Virginia's two senators voting differently?
ANSWER: **48%** [or **0.48**; or **12/25**]

4A. What country is known for forests of its namesake cedar tree, which is depicted on its flag?
ANSWER: **Lebanon** [or **Lebanese** Republic]

4B. What largest region of the ocean floor lies below the continental rise, is very flat, and can be interrupted by trenches?
ANSWER: **abyssal plain**

5A. What Russian term was used to refer to the period of increased transparency during Mikhail Gorbachev's rule?
ANSWER: "**glasnost**"

5B. Lycurgus mutilated his son's body as a result of the insanity inflicted by what Greek god of wine and revelry?
ANSWER: **Dionysus** [or **Bacchus**; or **Liber**]

6A. What artist depicted Ambrogio Spinola accepting a surrender in *The Surrender of Breda* and depicted the Infanta Margarita and her attendants in *Las Meninas?*
ANSWER: Diego Rodriguez de Silva y **Velazquez**

6B. What Bernini sculpture depicts the title Carmelite nun and an angel with a spear?
ANSWER: **Ecstasy of St. Teresa** [accept **St. Teresa in Ecstasy**, **Transverberation of St. Teresa**, or **L'Estasi di Santa Teresa**]

7A. What member of the PRI is the current President of Mexico?
ANSWER: Enrique **Peña Nieto** [do not accept or prompt on partial answer]

7B. What ancient Greek playwright showed the bloody aftermath of Agamemnon's return in the *Oresteia* trilogy?
ANSWER: **Aeschylus**

8A. What German playwright wrote *Mother Courage and Her Children* and collaborated with Kurt Weill on *The Threepenny Opera*?
ANSWER: Bertolt **Brecht**

8B. What French king, son of Marie de Medici, succeeded Henry IV and was married to Anne of Austria?
ANSWER: **Louis XIII** [prompt on **Louis**]

9A. This is a 30-second calculation question. What is the determinant of the matrix whose first row is [3 3 2], second row is [0 -4 1], and third row is [0 -4 3]?
ANSWER: **-24**

9B. This is a 30-second calculation question. Consider the graph of the function "*y* equals cosine of 2 *x*." Between *x*=0 and *x*=8 pi, how many times does this graph pass through *y*=0?
ANSWER: **16** times

10A. What two competitors for the 2016 Republican nomination have been involved in a recent feud, as one of them responded to accusations of pork barrel spending by calling the other the "king of bacon?"
ANSWER: Rand **Paul** and Chris **Christie** [prompt on partial answer]

10B. In *The Wealth of Nations*, Adam Smith used the example of a factory making what objects to argue for the division of labor?
ANSWER: **pin**s

1. In the epilogue of this novel, the main character has dreams in which a virus causes people to become insane and engrossed in their self beliefs. The protagonist falls in love with the prostitute Sonya by the end of this novel, in which Svidrigailov attempts to rape Dunya. In this novel, an impoverished man decides to gain wealth by murdering Alyona Ivanovna, and deals with the guilt after doing so. For 10 points, name this novel in which Raskolnikov murders a pawnbroker, written by Fyodor Dostoyevsky.
ANSWER: _Crime and Punishment_ [or _Prestupleniye i nakazaniye_]

140-13-90-07117

2. A prime can be written as a sum of two numbers of this type if and only if the prime leaves remainder one when divided by four, and Lagrange proved every positive integer can be written as the sum of at most four of them. The nth one of these numbers plus the $n+1$th odd number yields the next one. These numbers have an odd number of factors, because no prime is raised to an odd power in their factorization. For 10 points, identify these numbers like 0, 1, and 4, which you get by multiplying a number by itself.
ANSWER: **square** numbers

233-13-90-07118

3. In this novel, the lawyer Mr. Green arrives too late to change a dying man's will. One character in this novel falls in love with a young man after being bitten by a dog at his house. This novel's frame story concerns Lockwood, who stays at Thrushcross Grange. This novel's Byronic hero, the rival of Edgar Linton, is a dark orphan from the streets of London. For 10 points, name this novel about the destructive love between Catherine Earnshaw and Heathcliff, by Emily Bronte.
ANSWER: _Wuthering Heights_

192-13-90-07119

4. A Chilean flamingo named Pink Floyd once lived at this lake. Its largest island is named for an animal shot by explorers Kit Carson and John C. Fremont when visiting it. This lake is where Robert Smithson's artwork _Spiral Jetty_ is located, and it is where Antelope Island can be found. It is the remnant of Lake Bonneville, and it lends its name to a city founded by Brigham Young. For 10 points, name this lake in Utah known as "America's Dead Sea."
ANSWER: **Great Salt** Lake

052-13-90-07120

5. In this city, a black spot called the "Devil's Foostep" marks where Satan supposedly mocked its windowless Frauenkirche (FROW-en-kirk). This city on the Isar River is home to the BMW Headquarters. It hosted the 1972 Olympics, where Palestinian terrorists murdered 11 Israeli athletes. Theresa's Meadow, located in this city, is where millions gather annually to drink specially-brewed beer. For 10 points, name this site of Oktoberfest, the capital of Bavaria.
ANSWER: **Munich**

080-13-90-07121

6. Debye sheaths can be found between a solid and this type of substance. Langmuir probes are used to measure physical properties in these substances. A tokamak is a doughnut-shaped device that contains this substance. Sprites, blue jets, and St. Elmo's fire are natural examples of this type of substance. Both lightning and the sun are composed of this type of substance. For 10 points, name this fourth state of matter that is essentially an ionized gas.
ANSWER: **plasma**

7. This philosopher argued that a form of recognition called *anagnorisis* accompanied "reversal of intention," or *peripeteia*. In *On Rhetoric*, this philosopher classified argumentative techniques as *ethos*, *pathos*, and *logos*. He theorized that by seeing a hero fall from grace due to a tragic flaw, viewers of tragedy can undergo *catharsis*. For 10 points, name this Greek author of the *Poetics*, a noted student of Plato.
ANSWER: **Aristotle** [or **Aristoteles**]

8. In this novel, reproduction is assisted by use of the Bokanovsky Process and Podsnap's Technique. One character in this novel is surprised to find out that Mustapha has read Shakespeare; this novel takes its title from a quote by Miranda in *The Tempest*. Lenina Crowne and Bernard Marx meet John the Savage in this novel, in which people are given the drug Soma. For 10 points, name this dystopian novel set in the year 632 After Ford that was written by Aldous Huxley.
ANSWER: ***Brave New World***

9. Two conservative branches of this denomination that do not engage in merger discussions with its other branches are the Missouri and Wisconsin Synods. One founding member of this denomination, Philipp Melanchthon, formulated the Augsburg Confession, and this denomination's namesake wrote the hymn "A Mighty Fortress is Our God." For 10 points, name this Protestant denomination, prominent in Scandanavia, which is named for the leader of the Protestant Reformation.
ANSWER: **Lutheranism** [or variations]

10. A satellite named for this man discovered that lightning emits jets of antimatter, and in his namesake coordinate system, the metric tensor becomes the Euclidean metric. He erroneously claimed to have discovered the transuranides hesperium and ausonium, for which he won the Nobel Prize. He collaborated with Szilard on graphite moderator designs, which he applied to the Chicago Pile-1 reactor. His namesake paradox asks why humanity has not encountered extraterrestrial life. For 10 points, identify this Italian-American nuclear physicist who worked on the Manhattan Project.
ANSWER: Enrico **Fermi**

11. This man issued the gag rule on abolitionist petitions while Speaker of the House. He lowered the tariff in a bill named for his secretary of the Treasury, Robert Walker. Oregon was divided along the 49th parallel during his administration. Nicholas Trist ignored this man's demands to return to the United States, instead signing the Treaty of Guadalupe Hidalgo, which ended a war this President began. For 10 points, name this President who led the U.S. into the Mexican-American War.
ANSWER: James Knox **Polk**

12. The main character of this work buries a stranger who wore green and yellow, and that stranger's grave produces corn. A woodpecker tells the title character how to defeat the magician Pearl-Feather, and the woodpecker is rewarded by being dipped in the magician's blood. This poem describes the wigwam of the Nokomis "by the shores of Gitche Gumee." For 10 points, name this poem about the titular husband of Minnehaha, a work of William Wadsworth Longfellow.
ANSWER: The _**Song of Hiawatha**_

13. This man was imprisoned with Leung Quinn and Thambi Naidoo before reaching a compromise with Jan Smuts. This leader established an ashram at Sevagram, and he led a group of people to Dandi on the Salt March. This man worked for the rights of the "untouchable" class in his country, and he practiced a form of non-violent resistance called satyagraha. For 10 points, name this leader who struggled for the independence of India and was given the nickname Mahatma.
ANSWER: Mohandas Karamchand **Gandhi** [or Mahatma **Gandhi**]

14. This geometry is formed by the coordinating atoms of porphyrins around a central metal. Complexes with this geometry obey the 16-electron rule, rather than the standard 18 electron rule. Complexes with this geometry include a rhuthenium-containing hydrogenation catalyst named for Wilkinson and the anticancer drug cisplatin. This geometry has two lone pairs and four bonds. For 10 points, identify this molecular geometry with bond angles of 90 degrees.
ANSWER: **square planar**

15. This phenomenon's namesake frequency is proportional to the sine of latitude. This phenomenon creates westerlies at the boundary of the Hadley and Ferrel cells. The Ekman spiral is created by drag and this phenomenon. This phenomenon causes a clockwise motion in the Northern Hemisphere. Like the centrifugal force, this force is fictitious. For 10 points, name this force that deflects objects moving in a rotating reference frame, but does not actually cause the rotation of water in your toilet.
ANSWER: **Coriolis** effect [or **Coriolis** force]

1. H.H. Holmes confessed to murdering 27 women in this city during the 1893 World's Fair, which also introduced the Ferris Wheel. At a later event here, a speaker accused the police of engaging in "Gestapo tactics," leading to an angry outburst from its mayor. Protesters were attacked in Grant Park here during the 1968 Democratic National Convention. For 10 points, Richard J. Daley was mayor of which city, the largest in Illinois?
ANSWER: **Chicago**, Illinois

121-13-90-07132

2. One of these substances has a second generation in which an n-heterocyclic carbine replaces a phosphine; that example is used in metathesis. Their effectiveness is given by the turnover number, and they are hindered by poisons. Heterogenous ones have a different phase than the substance they are acting upon and commonly use an adsorption-based mechanism. Iron is used as one of these substances in the Haber process. For 10 points, name these substances which lower the activation energy of a reaction.
ANSWER: **catalyst**

048-13-90-07133

3. In this novel, the state auditor Byram White is blackmailed. One character in this novel raises concerns that bricks used by the J.H. Moore company are defective and becomes a hero after his warnings come to fruition in a an accident that kills three schoolchildren. That character in this novel is advised by Sadie Burke, and Jack Burden narrates this novel. For 10 points, name this novel by Robert Penn Warren about Louisiana politician Willie Stark, a character based on Huey Long.
ANSWER: *All the King's Men*

030-13-90-07134

4. The completion of this project was celebrated when one of its sponsors poured the contents of a barrel off the *Seneca Chief*. Thomas Allen wrote a nostalgic song about this project beginning "I've got a mule, her name is Sal." DeWitt Clinton got his state's legislature to fund this project, which was designed with a staircase of locks to get over the Niagara Escarpment. For 10 points, name this waterway in upstate New York that connected Albany to the Great Lakes area.
ANSWER: **Erie Canal**

080-13-90-07135

5. One can solve a simple harmonic oscillator by setting up an equation where this function is applied twice to an object's displacement. This operation can be denoted by placing a dot above a variable. This function is applied thrice to position to give the jerk, and when applied to angular momentum it yields the torque. This function of velocity gives acceleration, and this function of position is velocity. For 10 points, identify this calculus operation often used in physics, the opposite of integration.
ANSWER: time-**derivative** [or **differentiating** with respect to time; or **d over d t**; or obvious equivalents]

233-13-90-07136

What object is used by the boys in *Lord of the Flies* in order to create fire?
ANSWER: Piggy's **glasses**

This is a calculation question. What is the surface area of a regular dodecahedron if each face has an area of 8 square centimeters?
ANSWER: **96** square centimeters