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Tossups:

1. **A period of moderate liberalization in this country called "decompression" occurred during a military regime founded by members of the Sorbonne Group. Several members of the defunct Integralist Movement became key members of this country's military government, which presided over fourteen years of three-to - four digit inflation rates in which several different versions of the *cruzado* currency were issued. A child of Bulgarian Communist refugees who later became this country's president was part of its (*)** Palmares Revolutionary Armed Guard. This country's right-wing politician Jair Bolsonaro has exalted its past military governments. This country attempted to bolster its social welfare with the Bolsa Familia program, introduced by its president Luis Ignacio da Silva. For 10 points, the *real* is the currency of what country once led by Dilma Rousseff?
ANSWER: Federative Republic of **Brazil**

2. **This god attempted to kick Chaya, one of his father's maids, but instead she cursed him and his leg became infested with maggots. In one myth, this deity's son refuses to ascend to heaven because he does not want to leave behind a companion he has had since leaving Hastinapura, a small dog. This deity had transformed into that dog in order to test Yudhishthira's righteousness. This god known as "shrivelled foot" threw a noose to capture Markandeya's soul, but failed because he was kicked to death by an infuriated (*)** Shiva. This father of the oldest Pandava is the son of Saranya and the sun god Surya. He is aided by Agni, who brings people to his realm, Chitragupta. He records the good and evil actions of every human being, and he sits in judgment at Naraka. For 10 points, name this first mortal to die, the Hindu god of death.
ANSWER: **Yama** [or **Yama**raja; or **Yima**; or **Imra**; prompt on Dharma]

3. **Alexander Warenberg arranged one of this composer's symphonies into a concertante work for piano and orchestra he dubbed this composer's fifth piano concerto. The *scherzo* [SCARE-tzo] of that symphony by this composer ends with full brass playing a modification of the *Dies Irae* melody, which is introduced by chimes in the final movement of another of his pieces. That latter piece by this composer has a folk-like saxophone solo in its "Non Allegro" first movement and quotes a theme from his first symphony, whose (*)** premiere was screwed up by a possibly-drunk Alexander Glazunov. The hypnotist Nikolai Dahl helped this composer recover from that failure and received the dedication of this man's second piano concerto, which opens with bell-like chords. For 10 points, name this composer of *Symphonic Dances* and *Rhapsody on a Theme of Paganini*.
ANSWER: Sergei **Rachmaninov** [or Sergei **Rachmaninoff**]

4. **The vertical half-opening angle for collimated synchrotron radiation is inversely proportional to this quantity. In CGS units, this quantity appears raised to the sixth power in a generalization of the Larmor formula named for Lienard. This quantity is equal to the derivative of the coordinate time with respect to the proper time, and it is also equal to the hyperbolic cotangent of the (*)** rapidity. Multiplying this quantity times the time interval in the stationary frame gives the time interval in the moving frame. This quantity is equal to 1 at zero velocity. For 10 points, name this "factor" equal to one over the square root of quantity 1 minus v squared over c squared, which is used as a relativistic correction for many quantities.
ANSWER: Lorentz **gamma** [or relativistic **gamma** or the **Lorentz factor**]

5. **A painting originally owned by the House of Liechtenstein was attributed to this artist because of its similarity to this man's *Samson and Delilah*, which was long attributed to his contemporary Gerrit van Honthorst. The fury Alekto, accompanied by Pestilence, features in a painting by this artist that centers on a torch-bearing Mars in a breastplate. Another of his paintings shows anachronistic armored halberdiers storming out of a temple to kill people on (*)** Herod's orders. This artist's *The Consequences of War* allegorizes European conflict, like two versions of a painting he may have first executed in response to the Sack of Antwerp, his *Massacre of the Innocents*. His less violent works include a cycle of 24 depicting the education and marriage of a

queen who reconciles with her son Louis XIII. For 10 points, name this artist of the Marie de' Medici cycle known for fleshy nudes.
ANSWER: Peter Paul **Rubens**

6. **Francis Dana was originally chosen to join the commission involved in this event, but was replaced by a man described as "one of the two most impartial men in America." During the fallout from this event, Silas Talbot organized an expedition to capture a harbor in Santo Domingo. After this event, the diplomats Hottinguer, Bellamy, and** (*) Hauteval were secretly exposed by their employer to a man who ironically claimed credit for maintaining peace. As a result of this event, hostilities broke out that ended after the signing of the Treaty of Mortefontaine two years later. Negotiations during this event essentially ended after one participant exclaimed "No, no, not a sixpence!" For 10 points, name this 1798 diplomatic incident in which the French foreign minister Talleyrand demanded a large bribe.
ANSWER: **XYZ** affair [prompt on Quasi-War before it is mentioned]

7. **One girl with this name spends mornings with the narrator on a beach near the Hotel Mirana, and the two almost have sex in a cave before being interrupted by a pair of bathers. That narrator says he can only see that girl with *this name* in general terms like "honey-colored skin" or "thin arms," unlike *another* girl whose face he can summon immediately upon closing his eyes. Another girl with *this name* is "born" away by her "highborn kinsmen" from the narrator of a poem who claims that the (*)** envious angels in Heaven were "not half so happy" as the two of them. The narrator of one novel claims that because a girl with this name died at such a young age, he can only be attracted to "nymphets" like Dolores Haze. For 10 points, give this shared name of Humbert Humbert's first love and a girl who lies in a "sepulchre" by the sea in a poem by Edgar Allan Poe.
ANSWER: **Annabel** Lee [or **Annabel** Leigh]

8. **A writing script called Dalecarlian was common in this country's province of Dalarna until the 20th century. Residents of this country often take a coffee break called a *fika* and bake a layered sponge-cream dessert topped by green marzipan called a princess cake. Its lowest point contains a biosphere reserve along the banks of the Helge River, which passes by the city of Kristianstad. Oland is an island in this country separated from the mainland by the (*)** Kalmar Strait, and it also controls Gotland. Volvo was founded in this country. The capital of this country spans fourteen islands at the junction of Lake Malaren and the Baltic Sea. For 10 points, name this Scandinavian country bordered by Norway and Finland, with capital Stockholm.
ANSWER: **Sweden** [or **Sverige**]

9. **Expansions of the gut bacterium *Prevotella copri* are associated with the worsening of this disease. Disease activity in this condition is measured by the DAS28 score. Susceptibility to this disease is conferred by the HLA-DRB1 shared epitope motif. This disease, splenomegaly, and neutropenia make up Felty's triad. A combination of this disease and coal exposure can cause lung nodules, a condition called Caplan's syndrome. This disease is treated using DMARDs, some of which, like adalimumab and (*)** infliximab, inhibit TNF-alpha. This disease, whose symptoms include Z-deformities, swan-neck deformities and morning stiffness, has a namesake "factor", which is an IgM antibody that targets the IgG constant region. For 10 points, name this autoimmune disease that causes pain and inflammation in small joints.
ANSWER: **rheumatoid arthritis** [or **RA**]

10. **In one of this author's works, a woman has a dream of two beautiful women who begin to fight before her son yokes them to his chariot. That woman is told by her husband's shade to put on her finest clothes to greet her son after he returns from a defeat. At the start of another of this author's works, a woman imagines herself tangled in a net and cries out that a house stinks of murder, but still enters while praying for revenge on her (*)** captors. This author's satyr play *Proteus* was likely part of a cycle in which a young woman sees a set of footprints that resemble her own and discovers a lock of hair on a tomb left by her brother. That woman's mother lays out a purple carpet for Agamemnon before killing him, and her brother is acquitted by Athena after the Furies pursue him for killing his mother Clytemnestra. For 10 points, name this Greek playwright of the *Oresteia*.
ANSWER: **Aeschylus**

11. **One thinker with this surname refuted Quine's complaint that "unactualized possibles are disorderly" and claimed that certain entities are not "maximal consistent sets of sentences." Elizabeth Anscombe**

criticized another thinker with this surname for using the word "irrational" instead of "non-rational," arguing that non-rational ideas could generate rational ones. One philosopher with this surname claimed that while only our world is "*actually* real," other real possible worlds exist. (*) *Miracles* was written by an author with this surname, who presented a "trilemma" defending Jesus's divinity by claiming he must have been telling the truth, been mad, or been evil, in his book *Mere Christianity*. For 10 points, name this surname shared by David Kellogg and Clive Staples, the latter of whom funnelled his religious views into the *Chronicles of Narnia*.
ANSWER: **Lewis** [or **David Lewis** or **C.S. Lewis**]

12. **Flemish scholars argue that *Elckerlijc* inspired this play in which one man states that he would rather eat bread and water for five years than accompany the title character, because he has a cramp in his toe. Carol Ann Duffy and Hugo von Hofmannsthal created modern adaptations of this play, and Philip Roth named a novel after its line "Death, thou comest when I had thee least in mind." (*)** Confession offers the eponymous protagonist a "precious jewel," while the Doctor reminds the audience that Beauty, Five-wits, Strength, and Discretion will forsake you unless your account is "whole and sound." God sends Death down to take the title character, who can take only Good Deeds to the grave. For 10 points, name this 15th-century morality play, about a figure meant to represent a typical person.
ANSWER: *__Everyman__*

13. **Husayn's son Ali, the fourth Imam, compiled prescriptions for this practice in the text *Al-Sahifa al-Sajjad*. A compliment for a famous person called a *durood* may accompany formal instances of this practice such as *janazah*. Examples of this practice which do not have the status of *fard*, or obligatory, include *witr* and *tahajjud*. The surname Namazi refers to someone who performs this action many times. Isma'ilis are only prescribed three examples of this practice known as (*)** *fajr*, *maghrib*, and *isha*. This action is performed in cyclic actions called *rak'at* and must be done properly aligned with the *qiblah*. The *adhan* which calls on believers to perform this action is recited by muezzins in mosques at specific times of the day. For 10 points, identify this act of devotion which devout Muslims face Mecca to perform five times per day.
ANSWER: (Islamic) **prayer** [or **salat**, **salah**, **salawat**; accept **supplication**; accept **namaz** until "Namazi" is read; accept specific components of prayer such as **prostrating** oneself towards Mecca]

14. **Microscopic temperature gradients are introduced by these devices, which in turn induce changes in the hydration shell of macromolecules, in a method of measuring binding affinities called microscale thermophoresis. Small subpopulations of cells can be removed from a slide using a form of "capture microdissection" named for these devices. Continuous-wave types of these devices are used to induce changes in (*)** polarizability in Raman spectroscopy. These devices are often used to provide the "pump" in pump-probe spectroscopy; in those cases, these devices use chirped amplification to generate femtosecond pulses. For 10 points, name these devices that generate coherent light through stimulated emission of radiation.
ANSWER: **LASER** [or **light amplification by stimulated emission of radiation**; prompt on light]

15. **This man advocates fattening up people and laying them around for use as couches; a friend later tries to convince *this man* that "hell is an idea first born on an undigested apple-dumpling." This character throws a man who mimics him into the air before saving his life from an accident, and he is described as being "in the transition stage" because he goes (*)** under the bed to put his boots on. This man meets his best friend when they are forced to sleep together in an overbooked hotel after he stays out late "selling his head." He worships a small idol, Yojo, and after getting sick, carves himself a fancy coffin which eventually saves his friend's life. After demonstrating his skill with a harpoon, this ornately tattooed native of Kokovoko is hired to join the *Pequod*. For 10 points, name this cannibal friend of Ishmael in *Moby Dick*.
ANSWER: **Queequeg**

16. **According to Plutarch, one of member of this group was the first to scale Carthage's walls in the Third Punic War. The downfall of that member of this group was signalled by the Pontifex Maximus covering his head with his toga. Another member of this group spoke with his back to the Senate. That member of this group was killed by Lucius Opimius and had his head filled with seventeen pounds of lead to increase the payout of a (*)** bounty. Scipio Nasica Serapio alleged that one member of this group repeatedly touched his head because he wanted to be crowned king. These sons of Cornelia and grandsons of Scipio Africanus derived their

power from being elected as tribune of the plebs. For 10 points, name these Roman brothers, both assassinated while attempting to pass land reforms in the 2nd century BC, whose praenomina were Tiberius and Gaius.
ANSWER: **Gracchi** brothers [or **Tiberius** Sempronius Gracchus **and Gaius** Sempronius **Gracchus** before those names are read]

17. **One opera by this composer features cameos from Moses, Salome, Medea, and Oedipus in its second act, and features characters repeatedly asking in German "Where are We?" A play by Peter Handke inspired that opera by this composer, *The Lost*. In another of his operas, bells in A minor play as the title countertenor honors men who "came forth from" a certain figure's "two eyes" while at the "Window of Appearances"; that opera by him ends with a scene depicting ruins, and the narrator intoning "There is nothing left of this** (*) glorious city" to a group of tourists. A woman repeatedly utters "Mr. Bojangles" during a trial in another opera by this composer. Voices utter solfege nonsensically during the "knee plays" of that opera by this composer. For 10 points, name this composer whose "Portrait Trilogy" includes *Akhenaten* and *Einstein on the Beach*.
ANSWER: Philip Morris **Glass**

18. **A 1987 paper co-authored by Paul Milgrom shows that an optimal one of these constructs is linear if a risk-averse agent can control Brownian motion in an examination of their use in sharecropping. Lon Fuller argued that these things could not be defined by trans-social formal criteria and were based on justified reliance. *Carlill v Carbolic Smoke Ball Co.* determined that advertisements can initiate the** (*) creation of one of these things. Studying these things earned Oliver Hart and Bengt Holmström the 2016 Nobel Prize in Economics. The principle of promissory estoppel provides for equitable process even in the absence of an explicit one of these things. These things are said to be the manifestation of a "meeting of minds." They usually need consideration, offer, and acceptance. For 10 points, name these binding agreements between decision-making agents.
ANSWER: **contract**s [or **contract** theory; prompt on mechanism or agreement; prompt on social contract]

19. **This ruler founded Eton College to educate poor youths who would then attend Cambridge's King's College, which he also founded. A cult that developed around supposed miracles which occurred at this ruler's tomb was used to legitimize the rule of a future head of his house. This ruler wrote "Pleasure is a privy prick, Which vice doth still provoke," and was first captured at the Battle of Northampton. This son of** (*) Catherine of Valois was freed after the Second Battle of St. Albans and was forced to flee to Scotland after losing the Battle of Towton. Briefly restored by the Earl of Warwick in 1470, he was killed after the Battle of Tewkesbury, where his son Edward died and his wife, Margaret of Anjou, was forced to flee. For 10 points, name this last Lancastrian king of England who reigned at the start of the Wars of the Roses and was succeeded by Edward IV.
ANSWER: **Henry VI** of England [prompt on Henry]

20. **The HEALPIX algorithm was originally developed for studying this feature. Thomson scattering creates a linear polarization with vanishing divergence in this feature. The Eridanus supervoid may explain a "cold spot" in this feature. Primordial gravitational waves should imprint B-modes on the polarization of this feature. This feature, which was created from the** (*) surface of last scattering during the recombination era, was investigated by the COBE, WMAP, and Planck probes, which measured its anisotropy in order to test cosmic inflation. This feature was originally discovered by Penzias and Wilson in New Jersey. For 10 points, name this radiation that permeates the universe, a relic of the big bang with frequency between radio and infrared.
ANSWER: **cosmic microwave background** radiation [or **CMB**R]

Bonuses:

1. A quasar in the Pegasus constellation is called this man's "Cross." For 10 points each:
[10] Name this scientist who explained general and special relativity.
ANSWER: Albert **Einstein**
[10] This Henry Martinson science-fiction poem was inspired by Einstein's theory of general relativity; in it, the spaceship *Mima* permanently leaves the solar system before the ship's AI destroys itself.
ANSWER: *Aniara*
[10] This doctor performed Einstein's autopsy and stole and dissected his brain; years later, it was discovered that he had kept it in a glass mason jar, sometimes in a cider box under a beer cooler.
ANSWER: Thomas Stoltz **Harvey**

2. A photograph of this sculpture that served as the cover for the magazine *Review* was meant to symbolize Russia and its satellite republics and was used against the artist's wishes. For 10 points each:
[10] Name this sculpture, whose title object is surrounded by twelve empty chairs, which may represent the apostles of Jesus. It is part of a complex along with its artist's *The Gate of the Kiss*.
ANSWER: The *Table of Silence* [or the **Apostles' table**]
[10] *The Table of Silence* was created by this sculptor, who depicted Marie Bonaparte as a large gold sculpture in "Princess X." Many of this Romanian's sculptures are surprisingly phallic.
ANSWER: Constantin **Brancusi**
[10] This Brancusi sculpture is a stack of 17 rhomboids, representing the sacrifice of Romanian soldiers in WWI. It is located at Targu Jiu and is nearby by *The Table of Silence* and *The Gate of the Kiss*.
ANSWER: The *Infinite Column* [or the *Column of the infinite sacrifice* or the *Endless column*]

3. G.E. Moore's 1939 essay presents as a formal argument what many people probably think when presented with skepticism about the external world. For 10 points each:
[10] Moore's essay "Proof of an External World" argues that because these things are external objects, and he knows that these things exist, he thus knows than an external world exists.
ANSWER: **hand**s
[10] This Scottish philosopher is sometimes considered a skeptic, probably because of the views put forth by Philo in his *Dialogues Concerning Natural Religion*. Controversy over his perceived atheism ruined his debut, *A Treatise of Human Nature*.
ANSWER: David **Hume**
[10] Hume's argument against induction concerns the premise that nature possesses this property; Hume believed that we were neither a posteriori nor a priori justified in believing that nature has this property.
ANSWER: **uniform**ity [or the principle of **uniform**ity of nature; accept word forms or obvious equivalents; do not accept or prompt on "infallibility"]

4. This work's prologue places it in the spring, when "that Aprill, with his shoures soote / the droghte of March hath perced to the root" before going on to enumerate its characters' occupations. For 10 points each:
[10] Name this Geoffrey Chaucer work, which includes the Knight's Tale and the Wife of Bath's Tale.
ANSWER: The **Canterbury Tales**
[10] The pilgrims in the Canterbury tales are traveling to see the shrine of this "hooly blisful martir," whose assassination was depicted by T. S. Eliot in *Murder in the Cathedral.*
ANSWER: Thomas a **Becket**
[10] This tale centers around a merchant's wife who asks a monk for money to pay off her debts; the monk borrows the money from his good friend the merchant, and when the husband realizes what happened, she promises to pay him back in bed.
ANSWER: the **Shipman**'s tale [or the **Sailor**'s tale]

5. This process is believed to increase the rate of nonsynonymous substitution to synonymous substitution in the McDonald-Kreitman test. For 10 points each;
[10] Name this process in which individuals with advantageous traits are more likely to reproduce and thus pass on these traits to future generations. Darwin first posited it.
ANSWER: **natural selection** [prompt on evolution or Darwinian evolution]

[10] These diagrams joins together taxa that evolved from a common ancestor to represent the evolutionary relationships between similar organisms. Software developed by Felsenstein is commonly used to draw them.
ANSWER: **phylogenetic tree** [prompt on evolutionary tree or tree]
[10] Under this criterion, a phylogenetic tree minimizes the total amount of homoplasy. Phylogenetic trees with this criterion are necessarily the trees with the fewest number of mutational events.
ANSWER: **maximum parsimony** [or **MP**]

6. This policy's most famous opponent was imprisoned on Robben Island until his release in 1991. For 10 points each:
[10] Name this policy of systematic discrimination against minorities in South Africa.
ANSWER: **apartheid** [or **apart-hood**]
[10] This anti-apartheid activist helped organize the 1976 Soweto riots which criticized anti-indigenous language laws. He popularized the slogan "black is beautiful" and was killed by police in 1977.
ANSWER: Steve **Biko**
[10] This other anti-apartheid activist, descended from Lithuanian Jews, was a commander of the Spear of the Nation movement. He developed the "rolling mass action" strategy of protest.
ANSWER: Joe **Slovo**

7. One piece in this collection measures time in seconds rather than measures. For 10 points each:
[10] Name this collection of eighteen works by Luciano Berio. Its eighth piece calls for a B note to be sustained throughout the entire piece, and its tenth piece calls for a piano to serve as a resonator for trumpet sounds.
ANSWER: *Sequenza* [or *Sequence*]
[10] Berio's Sequenza V [five] is scored for this large brass instrument; the piece involves rattling a plunger mute against the bell of this instrument and performing difficult glissandi using its long brass slides.
ANSWER: **trombone**
[10] Berio quoted this other composer's symphony in the third movement of his *Sinfonia*. This symphony contains the "cry of despair" in its climactic third movement, and its fifth movement was inspired by a Klopstock poem that asks the listener to "rise again."
ANSWER: Symphony No. **2** by Gustav **Mahler** [or **Resurrection** Symphony or Die **Auferstehung**]

8. Examples of these theories include the 331 model and trinification. For 10 points each:
[10] Name these field theories which manage to combine electromagnetism, weak, and strong forces. They differ from theories of everything in that they don't account for gravity.
ANSWER: **GUT** [or **Grand Unified Theories**]
[10] This doubly-eponymous simple grand unified theory is based on the SU(5) group, and predicts the existence of X and Y bosons that allow the violation of baryon number.
ANSWER: **Georgi-Glashow** model
[10] The Georgi-Glashow model posits the decay of this particle with a half life above 10 to the 31 years. This particle is a positively-charged baryon found in the nucleus.
ANSWER: **proton**

9. This author described a deadly, beautiful maiden in "The Lorelei." For 10 points each:
[10] Name this German author of *Atta Troll* and the *Romanzero*.
ANSWER: Heinrich **Heine**
[10] This third book of the *Romanzero* describes a "mysterious stir and whisper" that "passes strangely" through the house as the steward moves through the silence lighting lamps. It includes a poem about Jehuda ben Halevy, a "star and torch to guide his time / light and beacon of his nation."
ANSWER: *Hebrew Melodies* [or *Hebraische Melodien*]
[10] Hannah Arendt praised Heine's integration of this language into German literature, identifying him as the beginning of the "hidden tradition" of the schlemiel.
ANSWER: **Yiddish**

10. Signed by President McKinley in 1898, the joint resolution advocated for by this man succeeded where the previous treaty failed due to the Ku'e Petitions. For 10 points each:

[10] The Newlands Resolution, advocated for by this man, saw the transfer of Hawaii to the US as a new territory in 1898. This man served as President of the Republic of Hawaii, and was the cousin of the founder of the Hawaiian Pineapple Company.
ANSWER: Sanford B. **Dole**
[10] The legislative process which led to the Newlands Resolution was initiated by this document promulgated in 1887 which greatly limited the power of the monarch. Drafted by Dole and backed by business interests and the Honolulu Rifles, it ensured voting rights were exclusive to literate, landed males and strengthened the elite.
ANSWER: **Bayonet Constitution** [accept 1887 **Constitution** of the Kingdom of **Hawaii**]
[10] The Bayonet Constitution was passed under this last king of Hawaii, who was succeeded by his sister Liliuokalani in 1891. Not to be confused with Charles II, he was known as "The Merrie Monarch" for his revival of hula and surfing.
Answer: **Kalakaua** [accept David La'amea Kamananakapu Mahinulani Naloiaehuokalani Lumialani **Kalakaua**]

11. This essay argues that living in a city requires people to develop a "protective organ." For 10 points each:
[10] Name this essay that compares the conflict between the two title entities to primitive man's struggle with nature. It argues that city living creates a sense of apathy and isolation but also provides greater freedom.
ANSWER: **"The Metropolis and Mental Life"**
[10] This author criticized urban planners in *The Death and Life of Great American Cities,* claiming that so-called urban renewal actually destroyed dense, multifunctional urban spaces.
ANSWER: Jane **Jacobs**
[10] Sociologist Ernest Burgess created the concentric zone model of cities, which divides them into circles. The outermost ring is named for these people who live in the suburbs and typically drive to the city to work.
ANSWER: **commuter**s

12. The animals from this artist's *Vision of St. Eustace* were so realistic they were thought to be Durer's for years. For 10 points each:
[10] Name this artist, who developed medals as a form for portraying many luminaries who employed him, such as John VIII Palaiologos. His other paintings of royalty include *Portrait of a Princess of the House of Este*.
ANSWER: **Pisanello** [or Antonio di **Puccio** Pisano; or Antonio di **Puccio** da Cereto; or **Vittore Pisano**]
[10] Pisanello is considered one of the last artists in the courtly "International" variety of this style from the late 15th century. Cathedrals built in this artistic style include Notre Dame de Paris.
ANSWER: **Gothic** style/architecture
[10] An artist with this surname served as the official portraitist of the doges of Venice and was even employed at one point by Mehmed II. That artist's brother made paintings like the *San Zaccaria Altarpiece* and *The Feast of the Gods*, which his student Titian finished.
ANSWER: **Bellini** [Gentile **Bellini** and Giovanni **Bellini**]

13. Most quantum chemistry softwares such as SMILES uses these orbitals for calculation due to their higher accuracy. For 10 points each:
[10] These atomic orbitals notably possess a cusp as distance approaches zero. Unlike another type of orbital, the radial primitive of these orbitals decay exponentially with respect to r, not r-squared.
ANSWER: **Slater**-type orbitals [or **STO**s]
[10] Slater-type orbitals can be used to approximate these other types of orbitals. The LCAO method involves calculating a linear combination of Gaussian orbitals and Slater-type orbitals to model these.
ANSWER: **Molecular Orbital**s [or **MO**]
[10] The only system for which atomic orbitals can be solved exactly is this one, in which a single electron is orbiting a single proton.
ANSWER: **hydrogen** [or **H**; do not accept "H+"]

14. The British added a 17-pounder gun to this tank to create its Firefly variant. For 10 points each:
[10] Name this tank officially designated the Medium Tank, or M4, named after a Union general who burned Atlanta.
ANSWER: M4 **Sherman** [or **Medium Tank**, **M4** until read; prompt on M4 until read]
[10] The M4 Sherman first saw action during this October 1942 battle, where the British Eighth Army under Bernard Montgomery won a victory that Churchill described as "the end of the beginning".

ANSWER: Second Battle of **El Alamein** [do not accept "First Battle of El Alamein"]
[10] This set of French-built fortifications was built to protect Tunisia against the Axis powers, but was used by them to defend against the British in an namesake March 1943 battle. While this battle was being fought, Patton attacked the Germans at El Guettar.
ANSWER: Battle of the **Mareth** Line

15. This woman interprets a dream about her taking away a stag and giving Gudrun a wolf cub. For 10 points each:
[10] Name this valkyrie condemned to live as a mortal woman, who is tricked into marrying Gunnar but falls in love with Sigurd when he rides through a ring of flame to get her.
ANSWER: **Brunhild**
[10] In the *Volsunga Saga*, this woman is the daughter of Sigurd and Brunhild. She is first raised by Brunhild's foster-father Heimer, who hides her inside a harp, and then by the peasant couple Ake and Grima.
ANSWER: **Aslaug** [or **Kraka** or **Kraba** or **Randalin**]
[10] Sigurd is cursed into forgetting about Brunhild by this sorceress, mother of Gudrun and Gunnar and wife of Gjuki. She later marries Gudrun off to Atli, causing Gudrun to snap and feed Atli their sons' hearts.
ANSWER: **Grimhild**

16. While trying to live by the title character's "Humanitist" philosophy, Rubião ends up having his entire inheritance swindled by a con man and his wife. For 10 points each:
[10] Name this author of *Philosopher or Dog?* who included a dedication to "the worm who first grabbed on the cold flesh of my corpse" in *The Posthumous Memoirs of Bras Cubas*.
ANSWER: Joaquim Maria **Machado** de **Assis**
[10] Machado de Assis is from this South American country, where Nacib Saad falls in love with the titular woman in Jorge Amado's *Gabriela, Clove and Cinnamon*.
ANSWER: **Brazil**
[10] In this novel by Brazilian author Clarice Lispector, the impoverished Macabéa is told by a fortune teller that her boyfriend will propose to her and a rich foreigner named Hans will fall in love with her. Before any of that happens, she is struck by a Mercedes and dies.
ANSWER: The ***Hour of the Star*** [or A ***hora da estrela***]

17. The operator used to find this quantity is represented as a downward-facing triangle. For 10 points each:
[10] Name this quantity, the dot product of a vector field with a (d/dx, d/dy, d/dz) vector. It produces a scalar field giving the density of the outward flux of a vector field stemming from each point.
ANSWER: **divergence**
[10] The divergence of a field's gradient is equal to an operator represented by an upwards-pointing triangle and named after this mathematician.
ANSWER: Pierre-Simon **Laplace**
[10] This process involves separating a smooth 3D vector field into the sum of an irrotational curl-free vector field and a solenoidal divergence-free vector field. Its irrotational part is equal to negative divergence of the vector field.
ANSWER: **Helmholtz decomposition**

18. Much knowledge of ancient Latin texts is owed to these people because they spent substantial portions of their lives copying stuff onto manuscripts. For 10 points each:
[10] Name these male ascetics who lived in cloisters and other enclosed religious communities in the Middle Ages.
ANSWER: **monk**s
[10] More extremely isolated than monks were these people, who chose to withdraw from secular life into cells and chambers attached to churches. Julian of Norwich was one of these people who - unlike hermits - had to take vows.
ANSWER: **anchorite**s
[10] This mystic, who frequently visited Julian of Norwich, wrote a namesake "Book" believed to be the first autobiography written in the English language and embarked on several pilgrimages to the Holy Land.
ANSWER: Margery **Kempe**

19. name some people who didn't like capital letters, for 10 points each.
[10] this writer of "anyone lived in a pretty how town" and "buffalo bill's" wrote about a time "when the world is mud-luscious" in "just-spring." he is probably the most famous poet to not use capital letters.

answer: e. e. **cummings** [or edward estlin **cummings**]
[10] this feminist theorist uses capitalization in her works such as *teaching to transgress* and *ain't i a woman?: black women and feminism* but notably not in her pen name. she discussed the devaluation of the word "love" in *all about love: new visions.*
answer: bell **hooks** [or gloria jean **watkins**]
[10] this writer used the lower case in his early poems like "the laughing heart" and "my old man." his other works include *poems written before jumping out of an 8 story window* and *ham on rye.*
answer: charles **bukowski**

20. A peasant rebellion was led in this modern-day country in 1653 by Niklas Leuenberger. For 10 points each:
[10] Name this country, whose other major internal conflicts include the Sonderbund War.
ANSWER: **Switzerland**
[10] Peasants led by Leuenberger sacked Lucerne, where a currency made of this material called the *Batzen* had recently been depreciated by 50%. Inflation caused by over-issuance of a currency made of this material in Russia caused a riot during the reign of Alexis I.
ANSWER: **copper**
[10] The forces that put down the rebellion came from this other Swiss city, where a controversy broke out earlier when Leo Jud served sausages during the Lenten fast. Its leaders included Huldrych Zwingli.
ANSWER: **Zurich**