

1. This quantity's tensor and its trace are multiplied by the two Lamé parameters in a 3D generalization of a certain law. An axis on which this quantity is plotted is the starting point of a line offset by 0.2% from the origin that is used to find the offset yield point. The ratio of two types of this quantity is negative in materials that tend to form domed-shapes when put into flexure, instead of a saddle-shape. That value is the ratio of the (*) transverse to longitudinal forms of this quantity, which is Poisson's ratio. The axial form of this quantity is the change in length per unit length. For 10 points, what quantity divides stress in Young's modulus?

ANSWER: strain

<Voight>

2. Despite a ban on wine, a corrupt ruler in this city was said to fill a pool with wine and bathe in it. Before founding the Cordoba emirate, a noble named Abd al-Rahman had to flee this city. Al-Walid built over a shrine of John the Baptist to construct this city's Great Mosque, near the burial sites of Nur al-Din, who acquired it after defending it from a Second Crusade siege. A government centered at this city, which fell after the Battle of Great (*) Zab, was founded by Muawiyah. In the pre-modern world, swords from this city had a wavy pattern on their surfaces, typical of its namesake pre-Toledo steel. In 750, this city lost out to Baghdad as the Islamic capital city. For 10 points, name this capital city of the Umayyad caliphs, which is now in Syria.

ANSWER: Damascus [or Dimashq]

<Jackson>

3. Bad results in this technique can occur due to the "smiling" effect. Tris, EDTA, and either borate or acetate make up the most common buffer used in it. Mobility shift assays to study protein-DNA interactions use this technique. This procedure is the final step of Sanger sequencing, after chain-termination occurs from a ddNTP. The intercalating agent (*) ethidium bromide is frequently used in this technique. The product of this procedure is blotted onto a nitrocellulose membrane and treated with radiolabelled probes in a technique named for Southern. In this technique, a comb is inserted into an agarose or polyacrylamide matrix to form wells. For 10 points, name this technique in which an electromotive force separates DNA fragments based on their length.

ANSWER: gel electrophoresis

<Silverman>

4. Andre Godard refurbished a mausoleum in this country that serves as a pilgrimage site along with the nearby Musalla Gardens. The *haft-sinn* table stays up for thirteen days after its new year, which entails jumping over bonfires. The eighteen "letters of the living" followed a religious leader from this country who claimed to be John the Baptist reincarnated and called himself "the (*) Gate." This country's new year's celebration is called Nowruz. This country's government executed the Bab, whose follower Baha'ullah went on to found the Baha'i faith. For 10 points, name this country whose Supreme Leader is the Shiite cleric Ali Khamenei.

ANSWER: Iran [or Persia]

<Bollinger>

5. This work's third book claims that people "see double" when temporal and spiritual authority are split, and discusses a Scripture-based Christian component to rule. This book's fourteenth chapter includes an injunction to keep one's contracts among nineteen Golden Rule-like "laws of nature," as contrasted with the singular "right of nature." It argues that, despite differences in strength and craft, men are equal since they are equally able to (*) kill each other. This book claims that people must "authorize" acts in their name via a "covenant" forming a commonwealth, which produces a sovereign. Written during the English Civil War, it claims that the state of nature is a "war of all against all". For 10 points, name this political treatise by Thomas Hobbes.

ANSWER: Leviathan: *Or, the Matter, Forme, and Power of a Commonwealth Ecclesiasticall and Civil*

<Jackson>

6. An autobiographical poem by this man begins "As a child, they could not keep me from wells" and concludes with the poetic rationale "I rhyme to see myself, to set the darkness echoing." This author of "Personal Helicon" described a biology lesson from Miss Walls about "great slime kings" who were "poised like mud grenades" on a flax-dam in a poem about his love for "the warm thick slobber of (*) frogspawn." The subject of a poem by this man "could handle a spade. Just like his old man", and that figure inspires this poet's declaration, "Between my finger and my thumb the squat pen rests. I'll dig with it." For 10 points, name this Irish Nobel laureate, the author of the collection *Death of a Naturalist* and a translation of *Beowulf*.

ANSWER: Seamus Justin Heaney

<Mehigan>

7. In one of this man's works, an urn-bearing woman and two torch-carrying girls proceed into a door under the inscription "Uxori optimae Albertus". In addition to that pyramidal tomb for Duchess Maria Christina, he sculpted a statue that stands next to a Robert Adam staircase in Apsley House and depicts an orb topped by a gilded Nike in the right hand of a man posing as *Mars the Peacemaker*. A woman's head lolls back as she reaches her arms up towards her (*) winged lover in one of this man's sculptures, while the subject of another holds an apple in her hand as she poses, nude from the waist up, on a couch. For 10 points, name this Venetian neoclassical sculptor of *Psyche Revived by Cupid's Kiss* and *Paulina Borghese as Venus Victrix*.

ANSWER: Antonio Canova

<Carson>

8. A Virginia Congressman with this surname added "sex" to the protected classes in Title VII of the Civil Rights Act of 1964 in a failed attempt to derail it. That Congressman with this surname sponsored a bill overturned in *Yates v. United States*, which made it a crime to advocate the violent overthrow of the US government. Another politician with this last name lost his party's nomination when he split the vote with "dry" candidate William G. McAdoo at the "Klan-bake", leading to (*) John W. Davis's candidacy. That New Yorker with this surname was nominated four years later as the "Happy Warrior" as the nation's first major Catholic presidential candidate. For 10 points, give this last name of Al, the Democrats' 1928 presidential candidate.

ANSWER: Smith [or Howard W. Smith; or Alfred Emanuel "Al" Smith; or Smith Act]

<Bentley>

9. This country reformed its census in 2010 after accusations of massive undercounting of the Montubio ethnicity. In 2011, Chevron was ordered to pay nine billion dollars in compensation for pollution near this country's Lago Agrio oil field. This country's Sangay National Park is home to the Tungurahua volcano, which erupted in February 2014. The Avenue of the Volcanoes is located south of its capital city. "Hieleros" mine ice from a mountain in this country that is the (*) farthest surface point from the center of the Earth, Mount Chimborazo. An archipelago here contains the islands of Baltra, Santa Cruz, and San Cristóbal. For 10 points, name this South American country which controls the Galapagos Islands and whose largest city is Guayaquil (gwai-ah-KEEL).

ANSWER: Republic of Ecuador [or Republica del Ecuador]

<Karas>

10. In "The Waste Land", Mr. Eugenides invites the narrator to one of these establishments on Cannon Street, followed by a weekend at the Metropole. Kent Lansing commissions Howard Roark to design one of these places called "The Aquitania" in *The Fountainhead*. In *Night of the Iguana*, Fred and Maxine Faulk manage one of these establishments visited by Reverend Shannon and his (*) tour group. In Fort Romper, Nebraska, Pat Scully owns one of these buildings around which a blizzard rages during a game of High Five in which the Easterner notices Johnnie cheating. For 10 points, name this kind of establishment where the cowboy and the Swede pay to spend the night in a short story by Stephen Crane titled for a blue one of them.

ANSWER: hotels [prompt on "buildings"]

<Mehigan>

11. In one of this man's paintings, a nude woman dips her foot into a river in front of a flock of birds. This artist of *The Goose Girl* created numerous paintings of a mother teaching a daughter how to knit, and showed a woman carrying a large jug in *Norman Milkmaid in Greville*. A man in blue pants and a red shirt carrying a sack strides purposefully across a field in his *The* (*) *Sower*. Salvador Dali created numerous variations of a painting by this man which contains a painted-over coffin beneath a praying couple in a field. This painter of *The Angelus* depicted three women bending over to pick up leftover bits of grain in another painting. For 10 points, name this member of the Barbizon School who painted *The Gleaners*.

ANSWER: Jean-François Millet

<Bentley>

12. In one short story by this author, a "secretary" pretends he is planning the execution of twenty-six Jews to give the Huddle siblings the title "Unrest Cure". In another story by this author, a fifteen-year old describes her aunt's "great tragedy". This creator of Clovis Sangrail also created a character who lives near a Houdan hen and is praised by Conradin for slaying the disagreeable Mrs. De Ropp; that character is a (*) pole-cat ferret named Sredni Vashtar. This author wrote a short story in which Framton Nuttel is duped into believing that Mrs. Sappleton's husband perished, leading to his astonishment upon seeing that same husband returning home through the title opening. For 10 points, name this British author of "The Open Window".

ANSWER: Saki [or Hector Hugh Munro]

<Naveh-Benjamin>

13. In an adaptation of this novel, its protagonist sings the songs "Thousands of Miles" and "O Tixo, Tixo, Help Me". Characters in this novel include the status-quo-loving Mr. Harrison, whose son John is given a thousand pounds to start a reform club, the politicians Tomlinson and Dubula, and the "agricultural demonstrator" Napoleon Letsitsi. The protagonist of this novel, which (*) Maxwell Anderson and Kurt Weill adapted into *Lost in the Stars*, learns that his sister Gertrude has become a prostitute and is joined by Theophilus Msimangu in searching Johannesburg for his son. At its end, Absalom is executed for the murder of Arthur Jarvis. For 10 points, name this novel about Stephen Kumalo, the first by Alan Paton (PAY-ton).

ANSWER: *Cry, the Beloved Country*

<Carson>

14. Two ancestors of these animals drink from the Well of Urd. One of these creatures appeared after Achilles strangled an invincible Trojan on his first day at Troy. They circle a shrine in the Eridanos river in Hyperborea. Phaethon's best friend bore the Greek name of this creature and became one in grief. In a common Germanic folktale, their namesake "maidens" have magical (*) robes which get stolen by men as they bathe. Brahma's consort Saraswati has one of these creatures as a mount. The union between Tyndareus's wife and one of these creatures may have produced Castor, Pollux, or Helen. For 10 points, name this bird, in whose shape Zeus seduced Leda.

ANSWER: swans

<Jackson>

15. One of these works by this composer contains a set of variations on "La gentille et jeune Lisette" and was nicknamed for Marie Antoinette. One of them opens with a military fanfare for its unusually large horn section and is called "Hornsignal". Another of these works by this composer replaces the oboes with two English horns and is nicknamed "The Philosopher". A "Sturm und Drang" one in F-sharp minor concludes with the musicians (*) gradually leaving the stage. Another of these works by this man is nicknamed for an unexpected fortissimo G major chord in its second movement, and is part of a set of twelve nicknamed "London". For 10 points, name these 104 orchestral works of an Austrian composer, which include ones nicknamed "Farewell" and "Surprise".

ANSWER: Franz Joseph Haydn's symphonies [prompt on partial answer; accept Haydn's Paris Symphonies before "English horns" is read]

<Lawrence>

16. Warriors of this culture often wore helmets made of boar tusks sewn on leather. Under a king called the *wanax*, this culture traded small vials of scented olive oil to Egypt, according to tablets written in Linear B. Its namesake site is home to "shaft graves" making up Grave Circle A and Grave Circle B, as well as the Lion Gate and nine massive, underground, beehive-shaped stone tombs called *tholoi*. An artifact from this culture depicts a handlebar mustache and beard on a gold burial mask. The (*) Dorian expansion ended this civilization, whose fall began the Greek Dark Ages. For 10 points, name this proto-Greek culture which postdates the Minoans and crafted the Mask of Agamemnon at its namesake Peloponnese citadel.

ANSWER: Mycenae [or Mikenēs; or Mycenaean Greeks; prompt on "Greeks"]

<Jackson>

17. Metals mixed with silica gels, called M-SGs, are used for this purpose in chemical reactions. Malonic and bromomalonic acid act as these species in the Belousov-Zhabotinsky clock reaction. In the Hall-Heroult process, elemental carbon acts as this species, and in organic chemistry, sodium borohydride and lithium aluminum hydride are a strong type of them. Alkali (*) metals almost always act as these species. This species is the reactant with the smaller standard electrode potential. In the presence of platinum, hydrogen gas acts as this agent when it reacts with alkenes and alkynes. These compounds will readily give up an electron. For 10 points, name these "agents" which get oxidized in redox reactions.

ANSWER: reducing agents [or reductant]

<Silverman>

18. Garrett Mattingly's book about this effort links its outcome with Anne de Joyeuse's loss at Coutras the previous year. In a botched response to this effort, John Norreys failed to install Antonio, Prior of Crato. Men in this effort feared Giambelli's "hellburners," which had terrorized forces during the Siege of Antwerp. This effort, preceded by the death of the Marquis de Santa Cruz, was orchestrated by Bernardino de Mendoza and inspired a speech at (*) Tilbury. Provoked by the Treaty of Nonsuch, and led by the Duke of Medina Sidonia, this force was rebuffed at the Battle of Gravelines by Lord Howard and Francis Drake, and by a storm labeled the "Protestant wind." For 10 points, name this force commissioned by Philip II in 1588 to invade England by sea.

ANSWER: Spanish Armada [or "Invincible Armada"; accept reasonable equivalents such as Philip II's failed invasion of England]

<Ray>

19. One article by this thinker denied the existence of true objective scientific analysis of culture. This man distinguished between the charismatic, traditional, and legal "ideal types" of leadership in a book that claimed the state has a "monopoly on the legitimate use of force". This thinker outline the development of institutions that "dominate through knowledge" in *Economy and Society*. This author of *Politics as a* (*) *Vocation* argued that individuals were increasingly trapped in an "iron cage" of bureaucratic rationality in a work that traced how the rise of Reformation asceticism led to the flourishing of the free market. For 10 points, name this German sociologist who wrote *The Protestant Ethic and the Spirit of Capitalism*.

ANSWER: Max Weber [or Karl Emil Maximilian Weber]

<Spencer>

20. If this process occurs underneath a glacier, then sideromelane may be produced. Density currents generated by this process deposit ignimbrite. The mixing of groundwater with the products of this process leads to the creation of maars. A type of this process involves the formation of gas slugs, tuff, and the creation of cow-pies, so named because they resemble manure. More generally this process produces a namesake column whose height is proportional to the silica content of the (*) liquid involved. Types of this process include phreatic, which leads to an explosion of steam, or Strombolian, in which lapilli, ash, and bombs are expelled as tephra. For 10 points, name these events which might occur in active, but not extinct, volcanoes.

ANSWER: volcanic eruptions [do not prompt on "volcanoes"]

<Jose>

21. DNase I binds this protein with very high affinity to prevent DNA auto-cleavage. *Listeria monocytogenes* hijacks a cell's machinery for producing this protein. Phalloidin, the poison from the death cap mushroom, inhibits the nucleation of this protein, which is catalyzed by the Arp 2/3 complex and by formins. When the intracellular concentration of this protein is intermediate between two critical concentrations, treadmilling occurs. When monomeric, this protein is (*) globular and prefixed by the letter F. ATP binds to this protein when it polymerizes into fibers that make up the spindle apparatus in dividing cells. For 10 points, name this protein that makes up microfilaments and slides along myosin during muscle contraction.

ANSWER: actin [or F-actin; or G-actin]

<Silverman>

22. This man claimed that "justice bends the arrow at your heart, and strains the bow," though the arrow does not fire. This author of a biography of David Brainerd died among the Mohicans after an over-strong smallpox inoculation killed him. This man worked to undo his grandfather Solomon Stoddard's Half-Way Covenant policy, though he inherited Stoddard's land at (*) Northampton. This "New Light" used the line "Their foot shall slide in due time," from Deuteronomy, to open an Enfield address likening people to spiders held over an infinite fire. For 10 points, name this colonial preacher who penned "Sinners in the Hands of an Angry God."

ANSWER: Jonathan Edwards

<Jackson>

23. In one short story by this author, the fraud-obsessed Neal takes a bunch of Benadryl and runs his car into a bridge abutment. This author included "Good Old Neon" in his collection *Oblivion*. A family created by this man includes a woman who has an affair with John "No Relation" Wayne and a womanizing punter for the Arizona Cardinals. In an effort to get Canada to secede from ONAN, the (*) Wheelchair Assassins seek the last work of a filmmaker who puts his head in a microwave in a novel by this man. For that novel, set in the Year of the Depend Adult Undergarment, this man created Michael Pemulis, who masters Eschaton, a game played by Hal Incandenza at the Enfield Tennis Academy. For 10 points, name this author of *Infinite Jest*.

ANSWER: David Foster Wallace

<Mehigan>

24. A bill supported by John Kline and George Miller in the U.S. House would consolidate grant programs for these entities. The first state law allowing the creation of these things passed in Minnesota in 1991. The Gulen movement has been accused of preferring Turkish companies when contracting for these places. Eva Moskowitz and Andrew (*) Cuomo have argued with Bill de Blasio in an effort to open more of these entities in New York City. Petitions can be used to create these institutions through some parent trigger laws, and some of their largest operators are Mater and KIPP. For 10 points, name these independent schools that receive some public funding.

ANSWER: charter schools [or charters, do not accept or prompt on "schools"]

<Reinstein>

1. Tod Hackett observes that the characters of this novel have "come to California to die". For 10 points each:

[10] Name this novel in which Tod plans to paint "The Burning of Los Angeles" and befriends a number of Hollywood hangers-on, including Homer Simpson.

ANSWER: *The Day of the Locust*

[10] *The Day of the Locust* is by this author, who created the malevolent newspaper editor Shrike in his novel *Miss Lonelyhearts*.

ANSWER: Nathanael West [or Nathan Weinstein]

[10] West dramatized a youthful failure in this sport in his short story "Western Union Boy." Another dramatization of this sport opens Don DeLillo's *Underworld*, when Cotter Martin retrieves Bobby Thomson's "Shot Heard 'Round the World."

ANSWER: baseball

<Mehigan>

2. Answer the following about problems with school grades, for 10 points each.

[10] One major problem is this trend, in which schools gradually award higher grades for lower quality work.

ANSWER: grade inflation

[10] This term refers to the pervasive difference between grades and test scores between distinct groups of students, usually those of different races or socioeconomic statuses.

ANSWER: the achievement gap [prompt on "gap"]

[10] Of course, the correlation between grades and this other variable is frequently misunderstood and often overestimated. This variable was first measured by Theodore Simon and Alfred Binet.

ANSWER: intelligence quotient

<Jose>

3. In first-order kinetics, a reaction's rate is directly proportional to a single reagent's concentration. For 10 points each:

[10] In first-order kinetics, a straight line with a slope equal to the negative rate constant is generated if *this function* of the reactant concentration is plotted against time.

ANSWER: natural logarithm [or common logarithm]

[10] For a first-order chemical or nuclear reaction, this quantity equals the natural logarithm of 2 divided by the rate constant. It is the time required for 50% of the starting material to react.

ANSWER: half-life

[10] This quantity is equivalent to the reaction order only if the reaction is elementary. This term refers to the number of molecules interacting at the transition state.

ANSWER: molecularity

<Silverman>

4. Sailboats can be seen in the background of several of this man's paintings, including *Capo di Noli* and *Women at the Well*. For 10 points each:

[10] Name this French artist who depicted art critic Félix Fénéon, the coiner of the term "neo-impressionism", holding a top hat in one hand and a flower in the other in front of a heavily-stippled swirl of colors.

ANSWER: Paul Victor Jules **Signac**

[10] Paul Signac used this style of small, distinct dots in many of his works. George Seurat, a pioneer of this style, used it for his *Sunday Afternoon on the Island of La Grande Jatte*.

ANSWER: **pointillism** [or word forms; prompt on "neo-impressionism" or "divisionism"]

[10] Seurat's most famous non-pointillist work is a painting in which a bowler-hatted man and several partially-clothed youths hang out on or near a riverbank, titled for "Bathers at" this location on the Seine in suburban Paris.

ANSWER: **Asnières-sur-Seine**

<Karas>

5. This man's crew included botanist Joseph Banks, who earned public fame for his drawings of hundreds of new plants aboard this man's expedition. For 10 points each:

[10] Name this British explorer and captain. He sailed the *HMS Endeavour* between the islands of New Zealand on his three Pacific voyages.

ANSWER: James **Cook**

[10] This occurrence happened to Cook on his third voyage at Kealahukua Bay on Hawaii. This happened in Mactan to Ferdinand Magellan when his ships were in the Philippines.

ANSWER: he was **killed** by the indigenous people [or **spear**ed; or **stab**bed to death; accept any answer indicating his **murder** or **death** in battle; do not accept answers including incorrect causes of death; prompt on "fought with natives" or similar]

[10] Cook used a copy of this craftsman's H4 clock, which won this man a prize for designing a machine to accurately determine longitude at sea.

ANSWER: John **Harrison**

<Jackson>

6. A legend has it that his barber told the grass that this king has "asses ears," which is why the grass still says whispers this king has asses ears to this very day. For 10 points each:

[10] Name this king who was cursed with the golden touch.

ANSWER: **Midas**

[10] Midas was given the golden touch as a gift after he took hospitable care of this satyr, who passed out in his garden.

ANSWER: **Silenus**

[10] After the golden touch became problematic, Midas went to one of these entities called Pactolus to rid himself of it. Another of them was Enipeus, whom Tyro loved.

ANSWER: **river** [or **river** gods]

<Jose>

7. This man wrote "The Sources of Soviet Conduct" in *Foreign Affairs* under the pseudonym "Mr. X." For 10 points each:

[10] Name this American diplomat who argued that the Soviet Union's actions could be explained by its historical sense of insecurity and who pushed for a policy of containment in the Long Telegram.

ANSWER: George Frost **Kennan**

[10] The Long Telegram was directed to the Secretary of State for this president. This man asked for aid for Greeks and Turks fighting Communists in a speech that formulated his namesake doctrine.

ANSWER: Harry S. **Truman**

[10] Truman first met Stalin face-to-face at this conference, where one national border was redrawn at the Oder-Neisse line.

ANSWER: **Potsdam** conference

<Bailey>

8. This man adapted a piece by lutenist Hans Neusiedler into the film score mainstay *Gassenhauer*, which is sometimes also credited to his mentee and longtime collaborator Gunild Keetman. For 10 points each:

[10] Name this German composer who developed a child-centered method of music education, his namesake "Schulwerk". Another of his works contains the falsetto tenor aria "Olim lacus colueram", sung by a swan being roasted alive.

ANSWER: Carl **Orff**

[10] Orff is most famous for this cantata based on a collection of medieval poems, whose opening and closing movements both feature the famous "O Fortuna".

ANSWER: **Carmina Burana** [or **Songs of Beuern**]

[10] Another European composer who developed a pedagogical method was this Hungarian, who popularized the cimbalom and used a "musical sneeze" to open a suite of music taken from his opera *Háry János*.

ANSWER: Zoltan **Kodály** [accept names in either order; pronounced "ko-DIE", but literal English readings are okay]

<Carson>

9. In her most famous literary appearance, this character is accused of plaguing ladies' lips with blisters and of drumming at soldiers' ears, before her accuser is interrupted by the word "Peace!" For 10 points each:

[10] Name this figure who supposedly "gallops night by night through lovers' brains" in a gnat-drawn hazelnut chariot. She is also said to be "the fairies' midwife".

ANSWER: Queen **Mab**

[10] That speech about Queen Mab is delivered by this character, who puns "Ask for me tomorrow, and you shall find me a grave man" shortly after being fatally stabbed by Tybalt.

ANSWER: **Mercutio**

[10] Before his death, Mercutio also wishes a plague on the feuding houses of Montague and Capulet, the central families of this Shakespeare play.

ANSWER: **Romeo and Juliet**

<Carson>

10. An example of this simple machine with a slope of 70.9 degrees was built after the Johnstown Flood to allow quick access between Johnstown and Westmont. For 10 points each:

[10] What simple machine is a tilted surface and is commonly called a ramp?

ANSWER: **inclined plane**

[10] This value for a frictionless inclined plane is the length of its slope over its height. In general, it's the ratio of the output force using a machine to the input force.

ANSWER: **mechanical advantage** [or **MA**]

[10] Given a box of mass m , experiencing only acceleration due to gravity, g , on a frictionless inclined plane with slope θ , what is the acceleration of the box?

ANSWER: g times **sine** of **θ** [do not accept partial answers]

<Voight>

11. A simple example of this technology's "crystal" form uses a long piece of wire, a metal rod, and a single diode. For 10 points each:

[10] Name this technology which demodulates a signal after receiving a carrier wave.

ANSWER: **radio** receiver [or **radio** transmission; or **AM** radio; or **amplitude modulation** ratio; or crystal **radio**]

[10] This Italian inventor pioneered long-distance radio telegraphy in the early 1900s.

ANSWER: Guglielmo **Marconi**

[10] This woman used her talents for physics to invent the "frequency-hopping" method, which prevented jamming of Allied radio signals during World War II. She was also a star actress from Austria.

ANSWER: Hedy **Lamarr** [or Eva Maria **Kiesler**]

<Jackson>

12. This vector operation is used to calculate torque and magnetic force.

[10] Name this form of vector multiplication that gives a result perpendicular to the two original vectors.

ANSWER: **cross** product

[10] This type of derivative on multivariable functions assumes that all of the independent variables, but one, are constant. Differential equations using this type of derivative are often contrasted with ordinary differential equations.

ANSWER: **partial** derivative [or **partial** differential equation]

[10] The cross product of the del operator, which takes partial derivatives, and a vector field is this operation, whose surface integral is related to a line integral by Stokes's theorem.

ANSWER: **curl**

<Reinstein>

13. The holder of this office calls the decennial Lambeth Conference at his residence. For 10 points each:

[10] Name this office whose holders are enthroned on the Chair of St. Augustine, named for the first one.

ANSWER: **Archbishop of Canterbury**

[10] The Archbishop of Canterbury is the head of the Communion of churches belonging to this faith, whose parent church was founded by Henry VIII to support his marital shenanigans.

ANSWER: **Church of England** [or **Anglican** Church]

[10] Anglicans partake in this liturgical service, whose choral delivery is broadcast weekly by the BBC. Like its counterpart, the matins, this service may be led by a layperson.

ANSWER: **Evening Prayer** [or **Evensong**]

<Gupta>

14. This city on the Arkansas River is home to the BOK tower. For 10 points each:

[10] Name this city in Oklahoma, home to the Golden Driller statue and Oral Roberts University.

ANSWER: **Tulsa**

[10] Tulsa defines the Cross Timbers ecoregion along with this Texas city, the second most populous in the Metroplex.

ANSWER: **Fort Worth**

[10] The West and Clear forks of this river join in downtown Fort Worth. It's the longest river located entirely in Texas.

ANSWER: **Trinity** River

<Karas>

15. Some species of these animals have host-specific mutualism with fig trees. For 10 points each:

[10] Name these animals which, together with bees and ants, form the suborder Apocrita. They include hornets and yellow jackets, and many make nests out of a paper-like material.

ANSWER: **wasps**

[10] Wasps and ants belong to this order of haplodiploid insects, in which eusociality evolved at least eleven separate times.

ANSWER: **Hymenoptera**

[10] Polydnviruses are carried by wasps with this kind of life history strategy. These organisms are different from parasites because they kill or sterilize the hosts that they live on.

ANSWER: **parasitoid**

<Kothari>

16. Answer the following about Andrea Palladio, for 10 points each.

[10] Palladio's *Four Books on Architecture* was a huge influence on this self-trained American architect and statesman, who designed the University of Virginia campus and based his plantation Monticello on Palladio's Villa Rotonda.

ANSWER: Thomas **Jefferson**

[10] Palladio's urban palazzi were inspired in part by this man's Palazzo Caprini. This man's most famous creation, located in the courtyard of the Roman church of San Pietro in Montorio, is the Tempietto.

ANSWER: Donato **Bramante**

[10] Palladio included two minaret-like bell towers in a church called "Il Redentore", which is located in this city. This city's other architectural highlights include many works of Jacopo Sansovino, the Rialto Bridge, and the Bridge of Sighs.

ANSWER: **Venice** [or **Venezia**]

<Carson>

17. While the protagonist of this poem is in the sphere of Jupiter, the phrase "cherish justice, you who judge the earth" is spelled out by spirits. For 10 points each:

[10] Name this poem in which the narrator is guided by his beloved through the nine Aristotelian cosmological spheres, encountering figures like Thomas Aquinas along the way.

ANSWER: **Paradiso** [or **Paradise**; prompt on *The Divine Comedy* or *Commedia Divina*]

[10] *Paradiso* is the third and final section of this author's *The Divine Comedy*.

ANSWER: **Dante Alighieri** [accept either; or Durante degli **Alighieri**]

[10] After passing through the nine celestial spheres, Dante emerges into this region, where he observes the harmonious arrangement of the Celestial Rose and is able to see the three rings that compose God.

ANSWER: the **Empyrean**

<Jose>

18. This site includes depictions of four black aurochs in the Hall of the Bulls. For 10 points each:

[10] Name this archaeological site, a cave complex in the Dordogne region which contains many large wall paintings of deer and other animals.

ANSWER: **Lascaux** cave system

[10] The Lascaux caves were painted during this prehistoric period, during which the Neanderthals died out and humanity developed basic tools.

ANSWER: **Paleolithic** era [prompt on "Stone Age"]

[10] The Lascaux site was discovered by four boys under this government, whose motto was "Work, family, fatherland."

ANSWER: **Vichy** France [or **État Français**]

<Bentley>

19. The speaker of this poem asserts that his "innocent and quiet" mind allows him, unlike "fishes that tippie in the deep" and "enlarged winds that curl the flood", an angelic sense of liberty. For 10 points each:

[10] Name this poem whose last stanza begins with the lines "Stone walls do not a prison make, nor iron bars a cage".

ANSWER: **"To Althea, From Prison"**

[10] "To Althea, From Prison" is the most famous work of this Cavalier poet.

ANSWER: Richard **Lovelace**

[10] In 1649, Lovelace published a collection titled for this woman. He notes "I'm still as happy as I was" in a poem addressed to her "Going Beyond the Seas" and includes the lines "I could not love thee, dear, so much, loved I not Honor more" in a poem addressed to her "Going to the Wars".

ANSWER: **Lucasta** [accept "To **Lucasta**, Going Beyond the Seas" or "To Lucasta, Going to the Wars"]

<Carson>

20. The votes for this procedure were cast by inscribing a name on shards of pottery. For 10 points each:

[10] Name this ancient Athenian political procedure, a vote by which the citizenry chose to exile a dangerous man without trial for ten years.

ANSWER: **ostracism** [or **ostracized**]

[10] This statesman of the Athenian Golden Age got his rival Cimon ostracized. He delivered a "Funeral Oration" before dying of plague.

ANSWER: **Pericles**

[10] This Persian emperor welcomed the ostracized Athenian general Themistocles, even though Themistocles wrecked his dad's navy at Salamis. This emperor's own navy lost at the Eurymedon river.

ANSWER: **Artaxerxes I**

<Jackson>

21. The WKB approximation is useful for solving Schrodinger equation so that the rate of this process can be calculated. For 10 points each:

[10] Name this quantum phenomenon in which a particle passes through a classically-forbidden barrier.

ANSWER: quantum **tunneling**

[10] The Esaki type of this device relies on quantum tunneling. These devices are semiconductors with two terminals and allow for current to flow in one direction under normal operation.

ANSWER: **diodes**

[10] This scientist applied the WKB approximation to quantum tunneling to mathematically explain alpha decay. He also wrote the *Mr. Tompkins* book series.

ANSWER: George **Gamow**

<Jose>

22. The Lusignan dynasty ruled from this island until the death of Queen Caterina Cornaro. For 10 points each:

[10] Name this island. The Venetian stronghold of Famagusta on this island was captured by the Ottomans in 1571.

ANSWER: **Cyprus** [or **Kibris**]

[10] Also in 1571, at this naval battle in the Mediterranean, an allied Christian force defeated the Ottomans under Ali Pasha. Miguel de Cervantes's arm was wounded in this battle.

ANSWER: Battle of **Lepanto**

[10] An admiral with this surname commanded the right wing of the Christian fleet at Lepanto. Another Genoese admiral with this last name lent his name to a passenger ship that sank in 1956.

ANSWER: **Doria** [or **D'Oria**; or Gianandrea **Doria**; or Andrea **Doria**]

<Bentley>

23. This character meets up with Remi Boncoeur in San Francisco and stays with Old Bull Lee in New Orleans with a friend who he realizes is a "holy goof". For 10 points each:

[10] Name this character who takes a number of road trips with a thinly-veiled representation of Neal Cassady named Dean Moriarty.

ANSWER: **Sal Paradise** [accept either underlined portion]

[10] This author of *The Subterraneans* and *The Dharma Bums* fictionalized himself as Sal Paradise in *On The Road*.

ANSWER: Jack **Kerouac** [or Jean-Louis **Kerouac**]

[10] At one point in *On The Road*, Dean abandons Sal in this city, where Sal is sick with dysentery. Dean had gone here in order to conveniently divorce his wife Camille.

ANSWER: **Mexico City**, Mexico

<Mehigan>