

ACF Nationals 2016

Packet by Stanford A (Austin Brownlow, Nikhil Desai, Stephen Liu, Benji Nguyen) and Louisville A (Kurtis Droge, Ramapriya Rangaraju, Nick Conder, and Megan Seldon)
Tossups

1. One of these beings illuminated a room when the lights went out during a music recital and turned into a stone that gave off deadly fumes until a priest smashed it with a hammer. That one of these beings had previously invented a method of torture in which people had to balance on top of a rotating bronze cylinder that was covered with oil and heated by a charcoal pit. These beings store power in floating “star balls” and are responsible for a culture-bound syndrome that makes people crave foods like adzuki beans and fried tofu. On the orders of Nuwa, one of these animals possessed King Zhou's concubine Daji. Pairs of statues with red bibs that flank vermilion *torii* depict these beings in their capacity as servants of Inari. Supernatural versions of these animals are known as *kumiho* in Korea, *huli jing* in China, and *kitsune* in Japan. For 10 points, name these animals that often take the form of beautiful women and may have up to nine tails.

ANSWER: **foxes** [or **vixens**; or **fox** spirits; accept ***kumiho***, ***huli jing***, or ***kitsune*** before they are read]

2. Over 70 people in this region were killed when someone wearing a badge of the anti-union Citizens' Alliance shouted fire at a Christmas Party. A newspaper based in this region was sued by Teddy Roosevelt after it accused him of getting drunk “not infrequently.” Charlie Moyer was removed from this region after its Italian Hall Disaster of 1913, which ended the Western Federation of Miners' attempt to unionize the Calumet and Hecla company here. This was the northernmost of two territories exchanged in the Frostbitten Convention of 1836, agreed to by the “boy governor” Stevens Mason. In the second half of the 19th Century, this region produced well over half of the copper in the US. It was traded for a southern strip of land at the end of the Toledo War. In 1850, this region's economy was bolstered by the opening of the Soo Locks. For 10 points, name this region home to Pictured Rocks and Tahquamenon Falls, located north of the Mackinac [“Mackinaw”] Bridge.

ANSWER: **Upper Peninsula of Michigan** [prompt on “**Michigan**”, accept **Calumet** or **Marquette** before the word “Calumet”]

3. This opera's fourth scene ends with music transitioning from the keys of D flat and B flat to the keys of A and E to mark two characters' decision to go to a fair. Church bells toll and an organ plays during a sequence in this opera set in front of a church, depicting the dream its main characters are simultaneously having. This opera closes with a passionate duet in which the protagonists sing “See the moonbeams kiss the woods”. Thomas Beecham, who conducted the premiere of this opera, was the first to separately perform an orchestral interlude from it named for an inn where the protagonists wish to dance all night. At the end of this opera, its two main characters scuttle the hay barge they are on and drown together. “The Walk to the Paradise Garden” plays in this opera before one of several meetings between Sali and Vreli and the Dark Fiddler. For 10 points, name this operatic adaptation of a Gottfried Keller short story, with music composed by Frederick Delius.

ANSWER A **Village Romeo and Juliet**

4. Stability against this process for a rotating star is given by the Ledoux Criterion, though if the density of stellar material is non-constant, the Solberg-Hoiland criterion is used instead since it adds a term dependent on the colatitude. The “semi-” form of this process occurs in regions with a molecular weight gradient, and can only occur if the differential of a certain quantity is less than gravity over heat capacity at constant pressure. This process only occurs if the Brunt-Vaisala frequency squared is less than zero—that frequency is often used to define the Schwarzschild criterion, which determines when this stellar process is stable. The tachocline is breached when this process’s namesake “overshoot” moves parcels into the radiative zone. Turbulent “granules” on the Sun are produced by, for 10 points, what mechanism of energy transfer that predominates in the liquid component of stars?

ANSWER: stellar **convection**

5. One of this work’s characters is described as a man who has been “dipping his red beard in tankards of democratic cafes” and was once convinced he had been made prefect on the Fourth of September. A woman in this work states that she wishes to treat “scores of Frenchmen” dying of smallpox in a hospital. As two nuns pretend to meditate, its title character is told stories about Judith and Holofernes, “and the matrons of Rome” immediately before people stop calling her “madame” instead using “mademoiselle.” Its title character eats a chicken wing and Regence rolls and gives them to her companions when they are starving, though they do not reciprocate at the climax, leaving her to cry. This story ends with Cornudet whistling and humming La Marseillaise after Elisabeth Rousset gives in and sleeps with a Prussian soldier. For 10 points, name this Guy de Maupassant story whose title refers to a portly prostitute.

ANSWER: "**Boule de Suif**" [or "**Ball of Fat**" or "**Dumpling**", "**Butterball**", or "**Ball of Lard**"]

6. The value of this function for a system with $O(2)$ (“oh two”) isotopic symmetry has an exact expression derived by Zamolodchikov that is a soliton solution of the quantum sine-Gordon equation. This function may be multiplied by a CDD factor without affecting its consistency with the bootstrap identity. A one-dimensional system is integrable if this function satisfies the Yang-Baxter equation. In quantum field theory, bound states correspond to poles of this function. Wick expansion of this function produces the Dyson series, which is an infinite sum of Feynman diagrams. In the interaction picture, this function is the asymptotic limit of the time evolution operator. The LSZ reduction formula and Born approximation are tools for calculating this function’s components, which represent probability amplitudes. For 10 points, name this unitary operator that maps in states to out states for a scattering process.

ANSWER: **S-matrix** [or **scattering matrix**; do not accept or prompt on “scattering” or “scattering amplitude”]

7. One ruler of this name received the Quaker missionary Mary Fisher, who traveled to his camp on foot, but was surprised to find that he already saw the light. That ruler's soldiers had their salaries paid in a devalued currency called the "red coin," so they revolted and killed 30 ministers, hanging their corpses from the "Vakvak Tree." That ruler of this name demanded a group led by Ivan Sirko submit to his rule, which prompted Sirko to write a letter full of insults, the Reply of the Zaporozhian Cossacks. In addition to that ruler, called the "Hunter," a better-known ruler of this name was crushed at the Battle of Vaslui by Stephen III. That ruler of this name allegedly had a love affair with Radu the Handsome, which led his army to be decimated during the Night Attack at Targoviste. That ruler built the Rumeli Hisari castle and a gigantic cannon to dethrone Constantine XI Paleologus. For 10 points, name that sultan dubbed the Conqueror for his sack of Constantinople in 1453.

ANSWER: Mehmed [or Mehmet, accept Mehmed the Conqueror, or Mehmed IV the Hunter or Mehmed II]

8. This philosopher used two rivers labelled ABF and CDG meeting at point E, as well as a boat and "lumps of white scum on the shore," to illustrate his theory of the motion of comets and planets through the heavens; that appears in a work which imagines a world based only on the classical elements of fire, air and earth. In another work, this philosopher wrote that the sight of an animal "coming toward us" reflects two images in our eyes, which are subsequently united. This philosopher's correspondence with Marin Mersenne discusses why he refused to send his book *Treatise on the Light* to him after hearing of Galileo's house arrest. Correspondence with Elisabeth, the daughter of Frederick the Winter King, led this philosopher to argue that the "seat of the soul" was the pineal gland. For 10 points, name this author of *The Passions of the Soul*, who also wrote *Discourse on Method*.

ANSWER: Rene Descartes

9. One character in this play assigns various things letter grades, such as calling Janis Joplin an "A- singer" and claiming a potato chip has "B- texture and C+ crunch". That character in this play is a journalist who dropped out of Princeton, which he calls the "Woodrow Wilson School of International Bullshit". The "Shoop Shoop" song plays at a high school dance in the first act of this play, which the title character attends with Susan Johnston. The title character of this play reacts angrily when she discovers her best friend is not madly in love with her because he's actually homosexual. A lecture at Columbia in this play discusses *Three Sisters Playing Chess*, *Judith Beheading Holofernes*, and other paintings. This play's title character attends a rally for Eugene McCarthy's campaign, where she falls in love with Scoop Rosenbaum. For 10 points, name this play following the life of a feminist art historian, which was written by Wendy Wasserstein.

ANSWER: *The* Heidi Chronicles

10. The plot next to this man's grave was bought by gay activist José Sarria, the founder of the Imperial Court System, so he could be married to this man forever. This resident of Eureka Lodgings bankrupted himself by investing in a shipment of Peruvian rice. He claimed that he was from Algoa Bay on the Cape of Good Hope, and always kept a peacock feather in his hat. His public feud with Freddie Coombs was about who was the real "Great Matrimonial Candidate." He appears as a character in Robert Louis Stevenson's novel *The Wrecker*, and was depicted by Ed Jump in many cartoons as the owner of Bummer and Lazarus, two stray dogs with whom he often dined at a lunch counter. One of his proclamations abolished both the Republican and Democratic parties, and named himself "Protector of Mexico." For 10 points, name this citizen of San Francisco who declared himself Emperor of the United States.

ANSWER: Emperor **Norton** [or Joshua Abraham **Norton**, or **Norton** I Emperor of the United States]

11. Christian Lindberg made the definitive recording of one of this composer's pieces, in which he altered the cadenzas to include more multiphonics. This composer of a *Concerto for Trombone and Military Band* wrote a piece that opens with a bass motif that emphasizes the notes E-D-C-B flat to represent a central male character. Another of his compositions concludes with a movement that features exclamations of "Resurrexit!" and shifts into 2/1 time. That piece opens in 5/2 time and features a solo cello evoking the theme "An angel cried out". A harp accompanies a violin solo that uses triplets to evoke an "oriental" theme used to represent the title female character of a composition by this man that includes sections such as "The Kalendar Prince" and "The Sea and Sinbad's Ship". For 10 points, name this Russian composer of *Russian Easter Festival Overture* and *Scheherazade*.

ANSWER: Nikolai **Rimsky-Korsakov** [or Nikolai Andreyevich **Rimsky-Korsakov**]

12. Characters in this novel include a crippled girl who works as a dressmaker for dolls and a peg-legged man who is employed to read aloud several biographies of misers, as well as *The Decline and Fall of the Roman Empire*. Another character in this novel dismisses any idea he does not like with a flourish of his right hand, part of a way of life referred to as "Podsnappery". A climactic scene in this novel is set at the Plashwater Weir Mill Lock and ends with the death of both Rogue Riderhood and Bradley Headstone, the latter of whom had earlier failed to prevent Eugene Wrayburn from marrying Lizzie Hexam. This novel's main character adopts the name Julius Rokesmith and woos Bella Wilfer while working for Mr. Boffin, who is blackmailed by Silas Wegg but finds a secret will in a giant rubbish heap. For 10 points, name this novel that begins with the retrieval of a drowned corpse thought to be that of John Harmon, the final completed novel by Charles Dickens.

ANSWER: **Our Mutual Friend**

13. This condition's association with sclerosing adenosis is controversial. Levels of CA15-3 in serum are used as a biomarker to detect and monitor the progression of this condition. One drug used to treat this condition is conjugated to the cytotoxic drug DM1 in its "emtansine" formulation. "Targetoid" and "Indian file" cell patterns are observed histologically in one form of this condition. Pressure on Cooper's ligament often causes an "orange peel" appearance in an aggressive form of this condition. This condition can be treated by SERMs like tamoxifen or by HER2/neu monoclonal antibodies such as Herceptin. About ten percent of patients with this condition have its difficult-to-treat "triple negative" form, because they test negative for ErbB2, progesterone, and estrogen receptors. This condition is divided into "ductal" and "lobular" subtypes. The genes BRCA1 and BRCA2 are correlated with development of, for 10 points, what condition treated by a mastectomy?

ANSWER: **breast cancer** [prompt on "cancer"]

14. One tribe in the north of this region had a tradition of drinking poison from yew seeds rather than be taken prisoner. Three soldiers of this region known as Audax, Ditalcus, and Minurus assassinated their own leader during his sleep, after allegedly being bribed by Quintus Caepio, which ended a guerilla campaign referred to by Polybius as the "War of Fire." Another leader of this region was betrayed at a banquet by Marcus Perpenna Vento. The Vaccaeii tribe of this region were massacred after a false treaty, as was this region's chief Viriathus. At a battle in this region in 207 BCE, Scipio Africanus deployed his legions on the wings of a concave formation and executed a "reverse Cannae" maneuver. The Battle of Ilipa took place in this region, where the Second Punic War began with the siege of Saguntum. For 10 points, name this region that witnessed the Sertorian War, the Lusitanian War, and the Cantabrian War, the Roman designation for the Iberian Peninsula.

ANSWER: **Hispania** [or Roman **Spain**; or Hispania **Lusitania**; accept **Iberian Peninsula** or **Cantabrians** before mentioned; also accept **Portugal** since that's the same area as Lusitania at this time; and accept Hispania **Gallaecia** or Hispania **Tarraconensis** or or **Hispania Ulterior** or **Hispania Citerior**]

15. A book about enterprise in this country argues that its exporting of raw materials combined with its importing of manufactured goods has retarded technological development, leading to economic growth but not economic development, and was written by Kari Levitt. A report co-written by Abraham Rotstein, and the author of the collection *Madness and Ruin*, describes this country's industry. That man, Mel Watkins, also wrote the preface to a book about multinational corporations in its economy, *Silent Surrender*—which renewed interest in this nation's Staples Thesis. A thinker from here used the example of a lightbulb to show that something could be illuminating without providing any content. That thinker wrote *The Mechanical Bride* and used the level of contemplation that a viewer must undertake to distinguish between "hot" and "cool" types of media. For 10 points, name this country home to Harold Innis and Marshall McLuhan.

ANSWER: **Canada**

16. This letter denotes a matrix used to transform Cartesian coordinates to internal coordinates in computational chemistry; that matrix is named for Wilson. This letter denotes a quantity equal to 2π times diameter cubed over 3 for a hard-sphere potential. That quantity denoted by this letter equals zero for a theta solvent, where polymer-solvent interactions are exactly balanced by excluded volume effects. The relationship between energy and angular momentum quantum number for a rigid rotor contains a constant denoted by this letter. This letter denotes a quantity which is zero at the Boyle temperature, and is multiplied by density squared in a power-series expansion of the compressibility factor. The second virial coefficient is denoted by this letter. For 10 points, name this letter which denotes the volume occupied by gas particles according to the Van der Waals equation.

ANSWER: **B**

17. Gerrit van Honthorst's depiction of this man shows him in an olive-green shirt with red lining, looking up from a piece of paper. The arrangement of figures in another depiction of this man may have been inspired by similar portraits of a goldsmith by Lorenzo Lotto and of Cardinal Richelieu by Philippe de Champaigne. That painting was intended as a guide for Bernini to create a bust of this man, an equestrian depiction of whom resembles Rubens' portrait of the Duke of Lerma. A painting of this man shows him flanked by a shield with his coat of arms on the left and Pierre Antoine Bourdin, the titular Seigneur de St. Antoine, on the right, as this man passes through an arch on horseback. This ruler's head is shown from three different angles in one portrait, while in another, his attendants tend to his horse while he leans on a staff during a break from hunting. For 10 points, name this king who was depicted many times by his court painter Anthony van Dyck.

ANSWER: **Charles I** of England [prompt on partial answers]

18. On the advice of a religious mystic, this event was delayed until a Saturday fell on the twelfth of a month, which started a tradition of associating luckiness with projects begun on the "Saturday of departure." A primary account of this event is found in the *Chronicle of the Seeker*. A harem of 500 women led by Inari Konte joined the leader of this event, who was performing repentance for killing his mother, Nana. Ships carried by those returning from this event were targeted in a revolt by the vassal state of Djenne at the town of Kami. The architect Ishak el Teudjin was recruited during this event, leading to the construction of the Djinguereber [Jin-gay-reber] Mosque. This event, which started from Niani, resulted in so much gold being distributed in Cairo that its prices were depressed for years. For 10 points, name this religious pilgrimage undertaken by an emperor of Mali.

ANSWER: **Mansa Musa**'s Pilgrimage to **Mecca** [accept **Mansa Musa's Hajj**; prompt on partial answer – accept any answer that specifies both "**Mansa Musa**" and "**Mecca**"]

19. According to one text, four of these structures can be found on top of four enormous mountains of antimony, while 48 more of them can be found on a floating continent which is only used by divinities. Inside of these structures, seashells wrapped in cloth placed on columns are used to commemorate teachers. Enormous “columns of honor” or are built in front of these structures, which allows one to lose their *mana*, or pride, before entering them. One of these structures was built as a *chaumukha*, which is why it has four faces. One of these structures, famed for its thousand pillars, can be found at Mudbidri and has a name translating as “The Crest Jewel of the Three Worlds Temple,” reflecting the cosmology of its religion. They are called either *Derasar* or *Basadi*, and feature worship of *tirthankaras*. For 10 points, name these places of worship used by both Digambara and Svetambara sects.

ANSWER: **Jain temples** [prompt on temples; accept derasar or basadi before they are mentioned]

20. A poet from this country is the attributed author of *Sailing Towards the Sunset* by Nell Zink, who spent 15 years sending all of her writing to that poet from this country. An author recognized as this country’s national poet wrote “Tombstones break, words pass, words are forgotten” but “prayers remain forever.” That German-born author who spent most of his life here wrote “I’ll never forgive the walls” and “My voice [will] change ... to the most terrible of voices” if the title action were to occur in another poem. A novel from this country describes the encounter of the narrator with the poet Zelda and is called *A Tale of Love and Darkness*. An author from this country wrote about Hannah Gonen, who narrates her dissolving marriage to the title geologist, in the novel *My Michael*. The national poet of this country is considered to be Yehuda Amichai. For 10 points, name this country of origin of Amos Oz.

ANSWER: **Israel** [accept State of Israel or Medinat Yisra'el or Dawlat Isra'il]

Tiebreaker: For a complete Riemannian manifold, if Ricci’s form of this quantity is bounded below by n minus one times k times the metric for some integer k , the manifold has diameter at most π over square root of k , according to Myers’ theorem. Any object for which the “total” form of this quantity is less than or equal to four π must be an unknot, according to the Fabry-Milnor theorem. Two types of this quantity must sum to zero at every point on a minimal surface. The “theorema egregium” shows that another form of this quantity is invariant under local isometry, and shows it can be computed as the ratio of the determinants of the second and first fundamental forms. The integral of that type of this quantity over a surface is equal to two π times the Euler characteristic of the surface. That “Gaussian” form of this property is the product of the two principal forms of this quantity. For 10 points, name this quantity that measures how much a manifold deviates from flatness.

ANSWER: **curvature** [accept Ricci curvature, total curvature, principal curvature, Gaussian curvature and other types of curvature]

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Bonuses

1. Answer the following about the New Model Army, for 10 points each.

[10] This 1645 law required all members of the Long Parliament to either resign their seat in Parliament or give up their military commission. Designed to prevent factious political armies like the Eastern Association, it led to the centralization of the New Model force.

ANSWER: **Self-Denying Ordinance** [prompt on partial answer]

[10] Despite the Self-Denying Ordinance, Oliver Cromwell served as master of horse during this 1645 parliamentary victory fought a year after Marston Moor. At this battle, Thomas Fairfax decisively defeated Rupert of the Rhine in the Broad Moor valley.

ANSWER: Battle of **Naseby**

[10] The cavalry at Naseby was commanded by this man, Cromwell's son in law, who in 1647 drafted the "Heads of the Proposals" propositions for dividing political power between the army, Parliament, and king. With Hugh Peters, he also wrote the "Remonstrance of the Army."

ANSWER: Henry **Ireton**

2. A gigantic one of these things pushes aside the shredded walls of a palace to menace Oya no Mitsukuni on the orders of Takiyasha the Witch in a mid-19th century print. For 10 points each:

[10] Identify these figures shown "warming themselves" and "fighting over the body of a hanged man" in paintings by James Ensor. An army of them ravages the countryside in Bruegel the Elder's *The Triumph of Death*.

ANSWER: **skeletons**

[10] *Takiyasha the Witch and the Skeleton Spectre* was created by Kuniyoshi, a member of this school of woodblock print artists. It was founded by Toyoharu, whose *uki-e* prints employed Western perspective.

ANSWER: **Utagawa** school

[10] This member of the Utagawa school was one of the last great masters of *ukiyo-e*. He created the massive series *Sixty-nine Stations of the Kiso Kaido* and *Fifty-three Stations of the Tokaido*.

ANSWER: Utagawa **Hiroshige** [or **Ando** Hiroshige]

3. The title character is likened to a "philosophical psychopath" in this essay, which declares that jazz is the music of orgasm. For 10 points each:

[10] Name this essay that laments the appearance of the title figure, an "American existentialist", also known as the "hipster". This essay later appeared in its author's *Advertisements for Myself*.

ANSWER: "The **White Negro**: Superficial Reflections on the Hipster"

[10] "The White Negro" was written by this author who chronicled the impending execution of Gary Gilmore in his book *The Executioner's Song*.

ANSWER: Norman **Mailer** [or Norman Kingsley **Mailer**]

[10] Norman Mailer also wrote the New Journalism piece "Superman Comes to the Supermarket", which was about this American figure's rise to prominence.

ANSWER: John Fitzgerald **Kennedy** [or **JFK**]

4. The degree of colocalization of two labeled biomolecules is an important quantity in a type of microscopy named for this phenomenon. For 10 points each:

[10] Name this phenomenon in which incident light excites an electron into a higher energy level that then quickly relaxes back to the ground state and emits a photon at a larger wavelength.

ANSWER: **fluorescence**

[10] Betzig, Moerner, and Hell shared the 2014 Nobel Prize in Chemistry for developing this class of fluorescent microscopy techniques, which include STED and STORM and operate on a scale smaller than the diffraction limit. ANSWER: **super-resolved** fluorescence microscopy [or **super-resolution** microscopy]

[10] This other sub-diffraction microscopic technique has “contact” and “tapping” modes, the latter of which uses piezoelectricity to control the oscillation frequency of a cantilever that is deflected by the surface under observation.

ANSWER: **atomic force** microscopy [or **AFM**; or **scanning force** microscopy; or **SFM**; prompt on “scanning probe (microscopy)” or “SPM,” do NOT accept or prompt on “STM” or “scanning tunneling microscopy”]

5. This man asked “In what sense is psychoanalysis a technique of the night?” and considered whether psychoanalysis is an “iconoclasm of the intimate” in one of his essays in *The Conflict of Interpretations*. For 10 points each:

[10] Name this author who argued that a “reflective philosophy” was needed to incorporate psychoanalysis and semiology in “The Question of the Subject.”

ANSWER: Paul **Ricoeur**

[10] Ricoeur’s *The Conflict of Interpretations* opens with an essay on “existence” and this concept. Gadamer’s *Truth and Method* offers a “philosophical” version of this approach.

ANSWER: **hermeneutics**

[10] One of Ricoeur’s first books analyzed the “symbolism” of this concept and argued that “defilement” is one of its three primary symbols. Its “banality” is the subject of a book by Hannah Arendt.

ANSWER: **evil** [accept *The Symbolism of Evil* or banality of **evil**]

6. A work by this historian examines the traditional French and English belief that monarchs could cure people of scrofula by placing a hand on the affected area. For 10 points each:

[10] Name this author of *The Royal Touch*, *French Rural History*, and *Feudal Society* who co-founded the Annales school of historiography along with Lucien Febvre.

ANSWER: Marc **Bloch** [or Marc Léopold Benjamin **Bloch**]

[10] André du Laurens started the legend that this founder of the Merovingian dynasty was the first to cure scrofula by royal touch. His conversion to Christianity, with the help of his wife, is chronicled by Gregory of Tours.

ANSWER: **Clovis I**

[10] This other Annales school historian wrote a landmark study of society in the Mâconnais region and explored the concept of “mentalities” in works like *The Legend of Bouvines* and *William Marshal: The Flower of Chivalry*.

ANSWER: Georges **Duby**

7. The line “Come now, let us reason together” from Isaiah 1:19 is frequently cited as motivation for this genre of Christian literature exemplified by G.K. Chesterton’s *Orthodoxy* For 10 points each:

[10] Name this genre of literature, exemplified by Karl Barth’s *Church Dogmatics*, which defends Christianity over all other religions and worldviews. Its name is derived from a Greek word meaning a “spoken defense.”

ANSWER: **apologetics**

[10] In his work of apologetics *Mere Christianity*, C. S. Lewis proposes a trilemma, which holds that Jesus was either one of these three things. You must give all three in any order.

ANSWER: **liar**, **lunatic**, or **Lord** [Players must give in any order the answers that indicate 1.) Jesus was **lying** 2.) Jesus was **insane** or **crazy** or 3.) Jesus is actually **God**]

[10] The author writes “I thought life might be a dream, or I an Angel, and all this world a deception, my fellow-angels by a playful device concealing themselves from me” in this other work of apologetics that defends its author’s switch from Anglicanism to Catholicism.

ANSWER: **Apologia Pro Vita Sua**

8. John Britton noted that F.R. Leavis's flippancy likely resulted in the title question of this essay being attributed to A.C. Bradley, though Bradley actually considered the matter immaterial. For 10 points each:

[10] Name this sassy 1933 essay by L.C. Knights that argues *for* further analysis of Shakespeare's "use of language to obtain a total complex emotional response" and *against* obsessing over minor details of his characters.

ANSWER: **"How Many Children Had Lady Macbeth?"**

[10] *Macbeth's* fifth act opens with a scene in which a doctor and a gentlewoman observe Lady Macbeth engaging in *this activity* and talking to herself, delivering such lines as "Out, damned spot!" and "All the perfumes of Arabia will not sweeten this little hand."

ANSWER: **sleepwalking** [prompt on "sleeping" or, indeed, "walking"]

[10] Macbeth laments Lady Macbeth's death in the "Tomorrow and tomorrow and tomorrow" soliloquy, in which "Life" is deemed to be this two-word thing, as well as "a poor player / that struts and frets his hour upon the stage".

ANSWER: "but a **walking shadow**" [prompt on partial answer]

9. This program used Monte Carlo tree search in conjunction with a novel application of deep convolutional neural networks to improve its ability to evaluate board states. For 10 points each:
[10] Name this game-playing program created by Google DeepMind. In 2016, it won four out of five games played against 9-dan player Lee Se-dol, signaling a potential breakthrough in efforts to achieve artificial general intelligence.

ANSWER: **AlphaGo**

[10] In game 3 of the series, AlphaGo showcased its prowess in a *tenuki* on move 148, which easily parried Lee's attempts to force one of these situations. This situation occurs when white and black could theoretically alternate single-stone captures without changing the board position; a "rule" prevents this from repeating infinitely.

ANSWER: **ko** [accept **ko** threat, **ko** fight, or other answers with "ko" in them]

[10] AlphaGo's achievements have been compared to those of the chess machine Deep Blue, which was developed by this company. This company also developed the Jeopardy-playing computer Watson.

ANSWER: **IBM** Corporation [or **International Business Machines** Corporation]

10. This versatile compound can induce polyploidy and inhibit mitosis by binding to tubulin, thus inhibiting microtubule polymerization. For 10 points each:

[10] Name this highly toxic biological compound that is nevertheless useful as a treatment for gout.

ANSWER: **colchicine**

[10] Colchicine is often used to induce polyploidy. Polyploid cells can be distinguished using this intercalating dye in flow cytometry, which has an emission maximum at 617 nm when bound to DNA.

ANSWER: **propidium iodide** [or **PI**]

[10] Radioisotope experiments indicate that the biosynthesis of colchicine's tropolone ring likely involves the expansion of an aromatic ring from this amino acid that contains a phenol group.

ANSWER: **tyrosine** [or **Y**]

11. This film begins with Jimmy Stewart's character Ranse Stoddard coming back to a town to attend the funeral of his friend Tom Doniphon, who perpetrated the title act. For 10 points each:

[10] Name this Western in which Stoddard, now a senator, reflects on how the title event shaped his political career and provided order to the town of Shinbone.

ANSWER: *The **Man who Shot Liberty Valance***

[10] *The Man Who Shot Liberty Valance* was directed by this man, whose other westerns include *Stagecoach* and *The Searchers*. He also directed *The Grapes of Wrath* and the Oscar-winning *How Green Was My Valley*.

ANSWER: John **Ford** [or John Martin **Feeney**]

[10] After discovering who really was the man who shot Liberty Valance, Carleton Young's character burns his notes saying that "When the legend becomes fact", this should be done. The exact three-word phrase is required.

ANSWER: **print the legend**

12. This man made an alliance with Nabopolassar, which resulted in the destruction of Nineveh and the Neo-Assyrian Empire. For 10 points each:

[10] Name this third and greatest king of the Medes, according to Herodotus. At the very end of his long reign, he fought the Battle of Halys River against Lydia, which infamously ended with an eclipse. After that, he was succeeded by the final Median king, Astyages.

ANSWER: **Cyaxares**

[10] Cyaxares was born in this city, the capital of the Median Empire according to the Greeks. It was allegedly built by Deioces in seven circles, each marked by a different color.

ANSWER: **Ecbatana** [accept Tell **Hagmatana** or **Hamadan**, or **Agamtanu** or **Agamatanu**]

[10] According to one account, Cyaxares' daughter Amytis inspired her husband Nebuchadnezzar II to build this "Wonder of the Ancient World" so that she would not miss the greenery of her Median homeland.

ANSWER: **Hanging Gardens** of **Babylon** [prompt partial answer]

13. According to Hesiod's *Works and Days*, this goddess will leave the Earth along with her companion Aidos, the personification of shame, at the end of the Fifth Age of Man. For 10 points each:

[10] Name this goddess of divine retribution with a temple at Rhamnous. Her role is to punish the hubris of mortals.

ANSWER: **Nemesis** [or **Adrasteia**]

[10] The *Bibliotheca* relates an alternate version of the birth of this figure in which she hatches from an egg laid by Nemesis. This figure is the sister of the Dioscuri and the wife of Menelaus.

ANSWER: **Helen** of Troy

[10] Nemesis's role is similar to that of this goddess, whose name refers to the folly of a Greek hero that leads to his ruin. Zeus cast this goddess out of Mt. Olympus for convincing him to make an oath that Hera was then able to manipulate for the benefit of Eurystheus rather than Heracles.

ANSWER: **Ate** (ah-tay) [or **Aite**]

14. This poem describes "masks and Bergamasks" that "strum lutes and dance, just a bit sad to be hidden beneath their fanciful disguise," and "reluctant to believe their happiness." For 10 points each:

[10] Name this poem that opens by stating that "our soul is like a landscape fantasy."

ANSWER: **Moonlight** [or **Clair de lune**]

[10] "Moonlight" was written by this French Symbolist whose first collection was called *Poèmes saturniens*. He is perhaps most famous for shooting his lover Arthur Rimbaud.

ANSWER: Paul **Verlaine**

[10] This poem by Verlaine was broadcast over radio to signal D-Day operations to the French Resistance. It opens by describing "the long sighs of the violins" during the title season.

ANSWER: **Autumn Song** [or **Chanson d'automne**]

15. The dispersion relation for an upper hybrid resonance adds the square of the cyclotron frequency to the square of this quantity. For 10 points each:

[10] Name this quantity, which equals the square root of the electron density times elementary charge squared divided by the product of mass and the vacuum permittivity. It is the characteristic frequency of electron oscillations in magnetohydrodynamics.

ANSWER: electron plasma frequency [accept answers describing that this is the “frequency of non-thermal electron oscillations in a plasma” or the “frequency of a Langmuir wave”]

[10] The frequency of electron plasma oscillations can be derived by performing this process on the MHD equations, then assuming that the perturbations vary in space and time sinusoidally.

ANSWER: linearization [accept word forms like “making the equations linear”]

[10] In a plasma, the product of the electron density, Boltzmann's constant, and temperature gives this quantity, which has units of force per unit area, such as the Torr.

ANSWER: pressure [or P]

16. A study testing the universalist view of linguistic relativity used Munsell chips to determine the number of these entities across different languages. For 10 points each:

[10] Name these specific linguistic entities. Berlin and Kay discovered eleven “basic” categories for these entities.

ANSWER: color term [accept equivalents like “color name” or “color word” or anything indicating a word for colors; do not accept or prompt on just “color(s)” or “word(s)”]

[10] The color term debate was sparked by this hypothesis usually named after two thinkers, which claims that language shapes one’s perception of the world. It is often used interchangeably with “linguistic relativity.”

ANSWER: Sapir-Whorf hypothesis [accept in either order; prompt on partial answer or Whorfian hypothesis]

[10] Along with Roger Brown, this thinker performed a study on the “codability” of color terms within the Zuni language. Together with Brown, he sought to test linguistic relativity as a formal hypothesis using color cognition.

ANSWER: Eric [Heinz] Lenneberg

17. For functions with one variable, there exist “butterfly,” “swallowtail,” “cusp” and “fold” types of these phenomena, with the equation “ F equals x cubed plus ax ” characterizing the “fold” one. For 10 points each:

[10] Name these phenomena, defined as bifurcations between equilibria. The branch of dynamical systems named after them was pioneered by Rene Thom.

ANSWER: catastrophes [accept catastrophe theory]

[10] All catastrophes originate at the “degenerate” type of these points, where one or more of the derivatives of a function equals zero.

ANSWER: critical point

[10] Many catastrophes cause a stable equilibrium state to jump into this other kind of state, in which the set of values that a system evolves toward exhibits a fractal appearance.

ANSWER: strange attractor [prompt on “attractor”]

18. This battle began when two distinct British forces advanced from Kennett Square with fog cover. For 10 points each:

[10] Name this battle in which William Howe's army outflanked George Washington by attacking the Birmingham Meetinghouse north of Chadds Ford. It was immediately followed by the Battle of the Clouds.

ANSWER: Battle of **Brandywine** Creek

[10] This general and Governor of New Hampshire led a major delaying action at the Battle of Brandywine while waiting for Nathanael Greene's reinforcements. He oversaw a namesake scorched-earth campaign against the Iroquois in 1779 in retaliation for Mohawk Valley.

ANSWER: John **Sullivan**

[10] This general commanded the Pennsylvania Line at the Battle of Brandywine and subsequently lost the Battle of Paoli. He earned the nickname "Mad" long before his victory at the Battle of Fallen Timbers.

ANSWER: "Mad" Anthony **Wayne**

19. The numbers 4 and 7 figure heavily in this numerology-obsessed composer's *Passacaglia in D minor*, as its ostinato theme consists of seven notes in four bars, and it appears 28 times. For 10 points each:

[10] Name this composer who also wrote a cycle of seven cantatas dedicated to the limbs of Jesus called *Membra Jesu Nostri*. He spent almost 40 years as the organist at the Marienkirche in Lübeck.

ANSWER: Dieterich **Buxtehude**

[10] This composer legendarily walked 400 kilometers just to watch Buxtehude play. This composer's own pieces include a *Mass in B Minor* and the *Goldberg Variations*.

ANSWER: **Johann Sebastian Bach** [prompt on **Bach**]

[10] Bach's *Goldberg Variations* may have been inspired by Buxtehude's 32 variations on this aria. Buxtehude's variations use a dance known as the "Bergamasca" as a basis.

ANSWER: "La **Capricciosa**"

20. This novella describes how Binetou marries her "sugar daddy" Modou, the former husband of the protagonist who must remain in a period of mourning for forty days. For 10 points each:

[10] Name this book, which is largely addressed to Aissatou, a woman who went to the U.S. after her first husband Mawdo marries a woman of higher birth.

ANSWER: **So Long a Letter**

[10] This author of *So Long a Letter* also wrote *Scarlet Song*, in which Mireille, the daughter of a French diplomat falls in love with Ousmane before killing their own baby after the latter has an affair.

ANSWER: Mariama **Ba**

[10] Mariama Ba wrote *So Long a Letter* in this European language, which Jean-Paul Sartre used to write "Black Orpheus," an essay praising Negritude.

ANSWER: **French**