

**ACF Regionals 2016: Ben There, Didn't Do That**

**Edited by John Lawrence, Chris Ray, Max Schindler, and Itamar Naveh-Benjamin**

**Packet by UC Berkeley A (Ankit Aggarwal, Aseem Keyal, Bruce Lou, Justin Nghiem), Columbia B (Saul Hankin, Wilton Rao, Shreyas Vissapragada, Peter Jiang), South Carolina (Christopher King, David Galban, Hannah Costanzo, Myndert Papenhuyzen, Eric Douglass, Bryn Douglass), McMaster A (Jay Misuk, Peter Cordeiro, Brian Luong, Kurtis Commanda, Raymond Chen)**

TOSSUPS:

1. In one poem by this author “the green lizard, and the golden snake, like unimprisoned flames,” who “out of their trance awake,” are used to describe the passing of the seasons during which “grief returns with the revolving year.” This author states that “some yet live, treading the thorny road, / Which leads, through toil and hate, to Fame’s serene abode” in a poem that calls for the “most musical of mourners” to “weep again!” That poem by him describes a dead man’s soul that “like a star, / beacons from the abode where the Eternal are.” He described “The hand that mock’d” and “the heart that fed” in a poem whose speaker encounters an inscription that reads “Look on my works, ye mighty, and despair!” For 10 points, name this English Romantic poet of “Adonais” and “Ozymandias”.

ANSWER: Percy Bysshe Shelley

2. This city has developed a curious shadow economy that seamlessly liaises with the regular economy through the use of *bate-ficha* middlemen. One building in this city, designed to look like a birdcage, is located at the foot of a bridge which features a dramatic triangular bulge in its middle section, a stylized version of which appears on this city’s flag. Popular attractions here include the ruins of the Jesuit college St. Paul’s and the aforementioned Governador Nobre de Carvalho Bridge, which connects to the island of Taipa. The largest casino in the world is this city’s Venetian, and 50% of its economy is made up by gambling revenue. This city on the Western side of the Pearl River Delta was returned in 1999. For 10 points, name this former Portuguese colony in China.

ANSWER: Macau [or Macao]

3. Nitric acid is used in one type of this process for recovering plutonium and uranium left over in used nuclear fuel. The raffinate produced in the most common type of this process is usually discarded. Green chemists love another form of this process relying on supercritical carbon dioxide. One device used for this purpose should not be shaken too violently, lest emulsions form that take annoyingly long to get rid of; that device is a pear-shaped funnel with a stopcock at the bottom. This process is more effective with high partition coefficients, as the concentration in the organic phase will be much greater than in the aqueous phase. It typically makes use of a separatory funnel. For 10 points, name this technique in which differences in solubility drive a solute from one immiscible fluid to another.

ANSWER: liquid-liquid extraction [or supercritical fluid extraction or partitioning, accept PUREX prompt on separation]

4. During a fiery speech, one figure in this book proclaims that God “does not dwell in houses made with human hands.” This text relates how Demetrius began a riot of silversmiths who kidnapped Gaius and Aristarchus. This book quotes Deuteronomy 18 in proclaiming the arrival of a new Moses, and includes Gamaliel’s warning to a court against executing a pair of men, an unusually tolerant portrayal of a Pharisee. A wind from Heaven in this book animates a group of men, who then begin speaking in tongues. This book recounts the stoning of Stephen, after which one of his persecutors is blinded on the road to Damascus and changes his name from Saul to Paul. For 10 points, name this continuation of the Gospel of Luke describing the activities of Christ’s followers after his death.

ANSWER: Acts of the Apostles

5. Support for this policy led to the murder of a man who had already been on thin ice for marrying New England society girl Harriet Ruggles Gold. Essays circulated under the pseudonym “William Penn” were used to lobby against this effort, which prompted excoriating speeches from Maine Congressman Peleg Sprague and Theodore Frelinghuysen. Elias Boudinot and John Ridge were killed for supporting this policy, which was opposed by missionary Jeremiah Evarts and Davy Crocket. It disregarded *Johnson v. M'Intosh* and *Worcester v. Georgia*, and was carried out with the treaties of Dancing Rabbit Creek and New Echota. For 10 points, name this subject of an 1830 act championed by Andrew Jackson that forced the Cherokee and other tribes from the southeastern U.S.

ANSWER: **Indian Removal** [accept any reasonable equivalents including **expulsion of the Cherokee**, **Tribal Relocation**, etc.; accept the **Trail of Tears**]

6. Giuditta Pasta requested that this opera's most famous aria be transposed down from G major to F major, a tradition upheld by many modern productions. After this opera's mezzo-soprano character agrees to abandon her newfound lover, she and the soprano sing the duet “*Si fino all'ore estreme*”. One character in this opera recalls a dream in which the woman he betrayed sends lightning to smite his new beloved at the altar in the aria “*Meco all'altar di Venere*”. At the beginning of this opera's second act, a woman prepares to murder her children with a knife. That character, who had an illicit romance with Pollione, earlier cuts the sacred mistletoe for the moon goddess in the aria “*Casta Diva*”. For 10 points, name this opera about the title Druid high-priestess by Vincenzo Bellini.

ANSWER: **Norma**

7. In Book IX of the *Iliad*, Phoenix tells this man's story as a cautionary tale to inspire Achilles to rejoin the fight. This man's daughter with his wife Cleopatra married a man who was the first to die in the Trojan War. Following this hero's death, his sisters Eurymede and Melanippe were turned into guineafowl. During an effort led by this hero, Nestor spear-vaulted away to safety and Ancaeus was mortally wounded. This hero's mother killed herself in grief after she killed this hero by burning a log that the Fates had tied to his lifespan. That filicide transpired as a result of this man's murder of his uncles, Toxeus and Plexippus, who had objected to him awarding a hunting prize to Atalanta. For 10 points, name this son of Althaea and Oeneus who led the Calydonian Boar Hunt.

ANSWER: **Meleager**

8. Schonhage and Strassen conjectured this lower bound on the runtime of algorithms for multiplying integers, though their algorithm takes log-log-n times longer. One algorithm with this runtime uses properties of 2-to-the-kth roots of unity and twiddle factors to cut down on the slower runtime of naïve discrete algorithms. Algorithms satisfying the recurrence  $T(n) = 2T(n/2) + O(n)$  have this runtime. The Cooley-Tukey algorithm for FFT has this runtime. Algorithms with this runtime are quasilinear with exponent one. Mergesort worst-case has this runtime, and this average runtime of quicksort is better than the worst-case  $n^2$ . For 10 points, what is the asymptotic runtime of doing  $n$  repetitions of an  $n$ -element binary search algorithm?

ANSWER:  **$n \log n$**  [or **linearithmic**, **loglinear**, accept answers with other letters in place of  $n$ , such as  **$E \log E$** , prompt on **quasilinear** or **quasipolynomial**, do not prompt on partial answers of any of the above – answers like “log  $n$ ” or “linear” are totally wrong]

9. This monarch's agents whipped up a moral panic against incest to derail the marriage of Sibylla to an opponent he had just defeated at the Battle of Bremule, William Clito, thus preventing William from allying with Fulk V of Anjou. St. Anselm was recalled, and then exiled again, by this monarch, who won the Battle of Tinchebray and issued the Charter of Liberties. This husband of Adeliza of Louvain and Matilda of Scotland resisted the claims of his brother Robert Curthose and lost his son William Adelin in the White Ship disaster. This king took the throne after a mysterious hunting accident killed his brother, William Rufus. For 10 points, name this youngest son of William the Conqueror whose death in 1135 gave way to the Anarchy.

ANSWER: **Henry I** [or **Henry Bueaclerc**]

10. One character in this novel has a recurring dream about fleeing to the “Protective City” to escape from an Arabian man called the “Shrouded Traveler”. The protagonist of this novel makes a bet with his friend about sleeping alone in the deserted ship *Admiral Freebee*. One character in this novel poorly performs his job as security guard at a shipyard barracks, by engaging in antics like breaking into his boss’s office with Remi Boncoeur. Two characters in this novel have a ritual in which they take Benzadrine, sit on a bed facing each other, and talk all night. The protagonist of this novel encounters Old Bull Lee and Carlo Marx while travelling with Dean Moriarty. For 10 points, Sal Paradise’s adventures are the subject of what landmark work of the Beat Generation by Jack Kerouac?

ANSWER: *On the Road*

11. One work by this author uses printing, gunpowder, and the compass as symbols of personal ambition, national ambition, and the ambition of the human race to extend its grasp. This thinker described three forms of false learning as “delicate”, “contentious”, and “fantastical” in categorizing the “distempers” that impede academic progress. This thinker imagined a utopian university called Salomon’s House, and he likened received systems of philosophy to stage plays that misrepresent the world, and thus labeled them “idols of the theatre”. This author of *The New Atlantis* established the doctrine of inductive, empirical methodology. For 10 points, name this 17<sup>th</sup>-century English philosopher who wrote *Novum Organum* and spearheaded the Scientific Revolution.

ANSWER: Sir Francis Bacon [or Baron Verulam; or 1<sup>st</sup> Viscount St. Albans]

12. One character in this play ignores news of his wife’s fever, while repeating the line “Poor fellow!” in response to reports of the gluttony of a character who drank four beakers of port. In one scene in this play, a man misses while trying to slap his impudent maid, who keeps interrupting him to protest his plans to marry off his daughter against her will. By hiding in a closet, Damis overhears the title character of this play attempt to seduce Elmire, the wife of his host. The title character plans to use Argas’ casket full of incriminating documents to blackmail the brother of Cléante, until a messenger from Louis XIV arrives to have him arrested instead. For 10 points, name this play in which Orgon’s family hosts the title religious hypocrite, a play by Molière.

ANSWER: *Tartuffe*; or, *The Imposter* [or *Le Tartuffe*; ou, *l’imposteur*]

13. Calculating a Racah W-coefficient requires knowledge of six parameters corresponding to this quantity. Another set of coefficients arising from this quantity relate reduced matrix elements to the spherical tensor. The individual components of the operator corresponding to this quantity commute with its square, but not with each other. That square of the operator corresponding to this quantity has as its eigenfunctions the spherical harmonics. This quantity’s conservation follows by Noether’s theorem from rotational invariance, and implies Kepler’s second law. In the case of a particle undergoing uniform circular motion, this quantity’s magnitude equals  $m \times v \times r$ . For 10 points, name this quantity, equal to moment of inertia times angular velocity.

ANSWER: angular momentum operator [or L, accept spin]

14. Coinage similarities caused this state's name to be appended to an unrelated Taxilan kingdom that produced stone palettes known as “toilet trays” and was founded by Gondophares I. The concubine Thermusa became queen of this state, but sparked a revolt by a disgusted populace after murdering her husband and marrying her son Phraataces. This state allied Quintus Labienus but was defeated at Amanus Pass and the Cilician Gates under Pacorus I. Surena won its greatest victory by pinning legionaries to their own shields, using composite bows to fire backwards from horseback, a tactic known as this empire's namesake “shot.” It was ruled by the Arsacid line and supplanted by Ardashir's Sassanids. For 10 points, name this Persian empire that defeated Crassus at the Battle of Carrhae.

ANSWER: Parthia [or Arsacid Empire before mentioned]

15. A dog, sack, and pitcher stand in the center foreground of this painter's version of *Christ Healing the Blind*. The central back panel of one of this artist's triptychs show pilgrims traveling to St. Catherine's Monastery as part of its depiction of Mount Sinai. The Christian Knight ascends to heaven in the front panel of that work by him, the *Modena Triptych*. He showed St. John the Evangelist standing in front of seven nudes who writhe in front of shimmering yellow and green cloths, in one work. In another painting by him, St. Stephen and St. Augustine bear the golden-armored corpse of the nobleman Don Gonzalo Ruíz, a native of Toledo. For 10 points, name this Spanish painter of *The Opening of the Fifth Seal* and *The Burial of Count Orgaz*, whose name reflects his Cretan origin.

ANSWER: **El Greco** [or Doménikos **Theotokópoulos**]

16. This thinker labeled the transfer of religious authority from a visionary prophet to an established priesthood as the "routinization of charisma." This thinker defined power as the probability that an actor will be able to carry out his own will, despite resistance. For years, the only English translation of this thinker's major work was an infamously error-riddled one by Talcott Parsons. This thinker wrote that states are defined by their "monopoly of the legitimate use of physical force." In another work, this author of *Economy and Society* suggested that the Lutheran concept of the "calling" inspired people to work hard to pursue wealth. For 10 points, name this German sociologist, the author of *Politics as a Vocation* and *The Protestant Ethic and the Spirit of Capitalism*.

ANSWER: (Karl Emil Maximillian) "Max" **Weber**

17. A short tract about this conflict notes that he who sees its results "and still dreams of a federated republic, belongs in a house for the insane." Doge Andrea Gritti refused to back a defeated leader after this conflict. One side in this conflict demanded the end to the *Todfall* inheritance tax as part of the Twelve Articles. This conflict prompted a notable essay comparing it to the 1848 revolutions by Friedrich Engels, and saw its primary leader executed in Mühlhausen after losing the Battle of Frankenhausen. The Swabian League put down this event, which was famously condemned in a tract about "murderous, thieving hordes" by Martin Luther. For 10 points, name this 1525 popular revolt led by men like Thomas Müntzer, that saw the oppressed lower class rise up in Germany.

ANSWER: German **Peasants' War** [accept any equivalents referring to **German peasants revolting**; accept **Müntzer's Revolt**; prompt on just The **Peasant's Revolt** until "Germany" is mentioned, accept afterwards]

18. He's not George Gershwin, but a cycle of this composer's music for piano and orchestra was popularly recorded in 1965 by Earl Wild and Jascha Horenstein. This composer included a C-sharp-minor theme for solo alto saxophone, accompanied by clarinet arpeggios, in the *Non Allegro* first movement of a piece whose three movements were originally titled "Noon", "Twilight", and "Midnight". He used an earlier composer's D-minor version of "La Folia" as the basis for his *Variations on a Theme of Corelli*. This composer of a set of *Symphonic Dances* inverted the theme in the D-flat-major eighteenth variation of a piece based on another composer's 24<sup>th</sup> caprice. For 10 points, name this Russian composer of *Rhapsody on a Theme of Paganini*.

ANSWER: Sergei (Vasilievich) **Rachmaninoff**

19. A serine/threonine kinase named for its role in the synthesis of this compound is inhibited by lithium in one treatment for bipolar disorder. This compound is synthesized by iteratively attaching subunits containing uridine diphosphate and then cleaving the UDP. It's not associated with the Wnt signaling pathway, but this molecule's production is regulated by the kinases CK-II and GSK-3. This compound's namesake phosphorylase depends on pyridoxal phosphate. Insulin triggers the synthesis of this compound, which is basically a more highly-branched version of the amylopectin found in plant starch. For 10 points, name this polysaccharide form of glucose stored in skeletal muscles and the liver.

ANSWER: **glycogen**

20. In a work by this author, a picture of a tree proclaims “I don’t want to be a tree, I want to be its meaning”. This author created a character who saves 4,213 cigarette butts discarded by the woman he loves. One of this author’s characters blinds himself with a plume needle, so that he can paint only from his memory, without using his eyes. Another of this author’s protagonists falls in love with a salesgirl who turns out to be a distant cousin, while he is shopping for a handbag for his fiancée Sibel. That protagonist collects mundane objects belonging to Füsün in this author’s *The Museum of Innocence*. He wrote a novel about the murdered miniaturist Elegant Effendi. For 10 points, name this author of *My Name is Red* and *Snow*, a Nobel Prize-winning Turkish novelist.

ANSWER: (Ferit) Orhan **Pamuk**

## BONUSES:

1. This technique's namesake debuted it at NCT2 in 2006, and used it to great effect in his second place finish at EVO 2013. For 10 points each:

[10] Identify this infinite combo, which should only happen to you if you're dumb enough to get grabbed by the Ice Climbers.

ANSWER: wobbling [accept word forms]

[10] Wobbling is a technique in this 2003 fighting game for the Nintendo GameCube. This game is superior in every possible way to its successor, the Wii's *Super Smash Bros. Brawl*.

ANSWER: *Super Smash Bros. Melee*

[10] EVO 2013 was won by Mango, who switched to playing Fox and Falco after originally maining this character. This adorable Pokemon's large number of jumps allows it to edgeguard you with the "wall of pain."

ANSWER: Jigglypuff

2. Answer some questions about some back-room bargaining from American history, for 10 points each:

[10] After finishing 4<sup>th</sup> in the 1824 election, this Speaker of the House from Kentucky convinced his backers to vote for John Quincy Adams. This advocate of the American system then became Secretary of State.

ANSWER: Henry Clay

[10] Elizabeth Holtzman asked whether this action was a "quid pro quo" during House hearings. This action was defended on the grounds of *Burdick v. U.S.* as a way of establishing guilt, and led to the resignation of Press Secretary Jerald terHorst.

ANSWER: Gerald Ford's pardon of Richard Nixon

[10] This agreement promised corrupt support for Thomas Scott's railroad ventures and led to David M. Key becoming Postmaster General. This deal shafted a New York governor who had broken up the Canal Ring.

ANSWER: The Compromise of 1877 [accept any answer about resolving the election of 1876, e.g. Hayes-Tilden Election Deal, etc.]

3. Beta blockers such as propranolol may worsen symptoms of this condition. For 10 points each:

[10] Name this condition that is often diagnosed by measuring a patient's FEV1. Its acute symptoms can be treated with beta-2 adrenoceptor agonists like salbutamol.

ANSWER: asthma

[10] Asthma, like cystic fibrosis, affects the production of this viscous fluid, which is secreted by the respiratory and digestive systems as a lubricant. In the nasal cavity, it provides protection from foreign bacteria and viruses.

ANSWER: mucus

[10] Although synthetic glucocorticoids are the preferred long term treatment for asthma, alternatives for mild asthma include cromolyn sodium. Cromolyn is a "stabilizer" of these cells that secrete histamine to cause inflammation.

ANSWER: mast cells

4. This figure granted Oshun the power of divination in exchange for a magnificent white cloak. For 10 points each:  
[10] Name this *orisha* who climbed down an enormous chain and sprinkled sand into the great sea to create land. There, he established the city of Ife.

ANSWER: **Obatala**

[10] The chain Obatala used was made of this material, given to him by all of his fellow *orishas*. In Greek myth, Midas was granted the unfortunate ability to turn anything he touched to this material.

ANSWER: **gold**

[10] A different *orisha* named Shango is sometimes known as the *orisha* of this phenomenon. In an Ojibwe myth, an enormous creature named for this phenomenon battled against a whale.

ANSWER: **thunder**

5. This character falls in love with the Russian princess Sasha during the 1608 Frost Fair on the Thames. For 10 points each:

[10] Name this character who lives over 300 years and changes sex from male to female. This character writes the poem *The Oak Tree*, with varying criticism from the poetaster Nicholas Greene.

ANSWER: **Orlando**

[10] Orlando is the title character of a novel by this English writer. James Ramsay desires a trip to the title location in this writer's novel *To the Lighthouse*.

ANSWER: Virginia **Woolf**

[10] Woolf details the history of nearly five decades of this family in the novel *The Years*. This family includes the patriarch Colonel Abel and Rose, who is jailed for participating in the Suffragette movement.

ANSWER: **Pargiter** family

6. Answer the following about the philosophical thought of Hans-Georg Gadamer, for 10 points each.

[10] Gadamer's major work, *Truth and Method*, belongs to this philosophical sub-discipline of textual interpretation, whose other major figures include Wilhelm Dilthey and Friedrich Schleiermacher.

ANSWER: **hermeneutics**

[10] In *Truth and Method*, Gadamer introduced this term for an idealized form of understanding in which the reader's field of perspective synthesizes with that of the text being read.

ANSWER: **fusion of horizons** [or *Horizontverschmelzung*]

[10] Gadamer's major contribution to aesthetics is an essay titled "The Relevance of" this concept. It is traditionally contrasted with "the sublime", and George Santayana defined it as "the objectification of pleasure".

ANSWER: the **beautiful** [be generous, and accept **beauty**]

7. This novella begins with the title character's impressment by Lieutenant Ratcliffe, and ends with a poem about its title character "in the Darbies." For 10 points each:

[10] Name this novel about a sailor who is falsely accused by Claggart of starting a mutiny aboard Captain Vere's ship.

ANSWER: **Billy Budd**, *Sailor (An inside narrative)*

[10] *Billy Budd* is by this American author of *Moby Dick*.

ANSWER: Herman **Melville**

[10] In *Moby Dick*, the crew of the *Pequod* encounter the ship the *Jeroboam*, whose crew all obey this raving Shaker prophet, who repeatedly predicts the death of Ahab.

ANSWER: **Gabriel**

8. This conflict was quelled by forces under Gnaeus Pompeius Strabo and Lucius Cornelius Sulla. For 10 points each:

[10] Name this conflict in which Roman allies such as the Marsi and Samnites rebelled against Rome after being denied franchise.

ANSWER: **Social War**

[10] The Social War was sparked in part because of the failure of this tribune to push through enfranchisement. His subsequent assassination was the immediate cause of the Social War.

ANSWER: Marcus Livius **Drusus**

[10] Twenty years after the social war, this escapee from gladiatorial training school joined with other runaway slaves at Mount Vesuvius and led a revolt. He and thousands of prisoners were crucified on the Appian Way.

ANSWER: **Spartacus**

9. You are a chemist who loves doing NMR spectroscopy. Name some things about some chemicals you might encounter while on the job, for 10 points each:

[10] If you're taking a standard NMR spectrum, chances are you'll use an isotopologue of chloroform as a solvent with the hydrogen replaced by this slightly heavier isotope.

ANSWER: **deuterium** [or **D**, or **CDCl<sub>3</sub>**, or **deuterated chloroform**, or **deuteriochloroform**]

[10] You'll also probably use this molecule as an internal standard for chemical shift, assigning its big singlet a shift of 0.

ANSWER: **TMS** [or **tetramethylsilane**]

[10] If can't use deuterated chloroform, you could instead use this common aprotic organic solvent. If you spill it on yourself, you might get a garlicky taste in your mouth.

ANSWER: **DMSO**-d<sub>6</sub> [or **dimethyl sulfoxide**-d<sub>6</sub>, or deuterated **DMSO**, or deuterated **dimethyl sulfoxide**]

10. A "break" in this piece features a pattern in which the left hand plays A-flats on beats one and two, to which the right hand replies with the rising sixteenth notes A-flat, C-flat, A-flat. For 10 points each:

[10] Name this syncopated piece in A-flat major, which may or may not be named after a club in Sedalia, Missouri.

ANSWER: **"Maple Leaf Rag"**

[10] The "Maple Leaf Rag" was composed by this African-American pioneer of ragtime, whose piece "The Entertainer" was used in the film *The Sting*.

ANSWER: Scott **Joplin**

[10] Joplin's rag "The Strenuous Life" was named for a speech by this man. The actions of this white man inspired Joplin's lost opera *A Guest of Honor*.

ANSWER: **Theodore Roosevelt** [or **Teddy Roosevelt** or **TR**; prompt on "Roosevelt"]

11. In one work by his author, he admits to being guilty of *accidia*, a melancholy that leaves one open to despair, and is chided for being bound by the "two strong chains" of love and desire for glory. For 10 points each:

[10] Name this author of the aforementioned *Secretum meum*, which consists of three dialogues between himself and Saint Augustine, with Truth as an arbiter.

ANSWER: **Petrarch** [or Francesco **Petrarca**]

[10] Petrarch lends his name to a type of this poetic form consisting of an octave and a sestet.

ANSWER: **sonnets** [or **sonetto** or **sonetti**]

[10] Petrarch's love for Laura is the principal theme of this collection of 366 poems, sometimes divided into two sections titled "During the Life of Madonna Laura" and "During the Death of Madonna Laura."

ANSWER: *Il* **Canzoniere** [or *The* **Songbook**; accept **Rime Sparse** or **Scattered Rhymes**]



12. Juraj Jánošík is known as the “Robin Hood” of this people, whose other icons include People's Party leader Andrej Hlinka, one of history's few financier-priests. For 10 points each:

[10] Name this European national group led by Bela Tuka and not-so-great priest Jozef Tiso during its Nazi puppet “First Republic.”

ANSWER: **Slovaks** [accept **Slovakia**, etc.]

[10] For years before and after World War II, Slovakia was united with this present-day country.

ANSWER: **Czech Republic** [or **Česká republika**; accept **Czechoslovakia**]

[10] Prior to World War II, most historic Slovak enmity had been directed at this country, which lost a good deal of territory in the Treaty of Trianon. It had its own pro-Nazi issues with the Arrow Cross Party.

ANSWER: Kingdom of **Hungary** [or **Magyar Királyság**]

13. Wavefunctions for this system contain Hermite polynomials. For 10 points each:

[10] Name this quantum mechanical system, with a potential described by Hooke’s law. Its ground-state energy is  $\hbar\omega$  over two.

ANSWER: quantum **harmonic oscillator** [or quantum **harmonic oscillation**; accept **QHO**]

[10] Dirac developed a method for solving the harmonic oscillator using these operators that either lower or raise the state of the system. They are sometimes referred to as “annihilation” and “creation.”

ANSWER: **ladder** operators

[10] This man’s namesake kernel is the fundamental solution to the quantum harmonic oscillator’s Hamiltonian. Conical functions are the kernel of a transform he co-names with Fock.

ANSWER: Gustav **Mehler** [sadly, this is not a typo of Gustav Mahler, which is an incorrect answer]

14. This religion’s five exercises are intended to turn the “dharma wheel” that embodies the principles of truth, goodness, and forbearance. For 10 points each:

[10] Name this religion founded by Li Hongzhi. China's ongoing persecution of this group includes a disturbingly large-scale organ harvesting program.

ANSWER: **Falun Gong** [or **Falun Dafa**]

[10] This Vietnamese religion venerates the Buddha, Sage, and Saint as the three stages of spiritual enlightenment. This religion believes that Earth is the 68<sup>th</sup> out of 72 planets in closeness to heaven.

ANSWER: **Cao Đài**

[10] The first of the Three Anchors of Cao Đài are the teachings of this Chinese analogue to the Indian Bodhisattva of compassion, Avalokitesvara.

ANSWER: **Guanyin** [or **Guanshiyin**]

15. One fresco in this building depicts a gold-cloaked Judas kissing Jesus, as men around them raise wooden sticks and blazing torches. For 10 points each:

[10] Name this Padua chapel consecrated in 1305 containing 37 scenes from the lives of Christ and Mary. Ten small anguished angels fly above a group of mourners in the *Lamentation* fresco at this early Renaissance site.

ANSWER: **Scrovegni Chapel** [or **Arena Chapel**]

[10] Vasari called this painter of the Scrovegni Chapel frescoes and the *Ognissanti Madonna* the ugliest man in Florence. In another Vasari story, this man painted a fly so lifelike that his teacher Cimabue tried to brush it off.

ANSWER: **Giotto** di Bondone

[10] Half of Giotto’s Peruzzi Chapel series depicts scenes from this man’s life, including the *Annunciation to Zacharias*. The Wilton Diptych depicts this man as the patron saint of Richard II.

ANSWER: **John the Baptist** [prompt on partial answer; do NOT accept any other John, such as “John the Evangelist”]

16. In this novel, a photograph of the main character having sex with the reporter Melanie Bruwer causes both his estrangement from his wife and the loss of his teaching post. For 10 points each:

[10] Name this novel in which Ben du Toit attempts to discover the truth about the death of Gordon Ngubene, but fails due to the efforts of Captain Stolz and the Special Branch.

ANSWER: A **Dry White Season**

[10] That novel's author, André Brink, was a cofounder of the Sestigers, a group of authors writing in this language. Another cofounder of the group, poet Breyten Breytenbach, also wrote in this language.

ANSWER: **Afrikaans**

[10] Brink is from this country, in which Afrikaans is most commonly spoken. It was also the home of the author of the novel *Cry, the Beloved Country*, Alan Paton.

ANSWER: Republic of **South Africa**

17. On a price-quantity graph, this curve is almost always downward-sloping. For 10 points each:

[10] Identify this graphical representation of how much of a good consumers want. In a free market, the equilibrium is where it intersects the supply curve.

ANSWER: **demand** curve

[10] This equation finds the derivative of demand for good X with respect to the price of Y, decomposing the change into easily-calculated substitution and income effects.

ANSWER: **Slutsky** equation

[10] Like everything else in microeconomics, deriving Slutsky's equation is easier with this theorem. Basically, it says that the change in some function's maximum can be found by evaluating the partial at the point that that maximum was achieved.

ANSWER: **envelope** theorem

18. This architect collaborated with Vlado Milunić on a Prague building whose twisting façades gave it the nickname "Fred and Ginger." For 10 points each:

[10] Name this Postmodernist Canadian-American architect of the Dancing House whose other projects include the Walt Disney Concert Hall in Los Angeles.

ANSWER: Frank Owen **Gehry**

[10] Gehry's Weisman Art Museum is located in this American city, which is also the location of Cesar Pelli's Wells Fargo Tower and Philip Johnson's IDS Tower.

ANSWER: **Minneapolis**, Minnesota

[10] Michael Graves designed this other Postmodern building, named for the American city in which it is located. It features horizontal lines within a trapezoid at the top of its façade and vertical lines around its four sides which are themselves dotted by small windows.

ANSWER: **Portland Building** [or **Portland Municipal Services Building**]

19. Answer the following about how one can die in a volcanic eruption, for 10 points each.

[10] These fast mudflows form when pyroclastic material mixes with some source of water on the volcano's side. The one after the 1991 eruption of Mt. Pinatubo was responsible for most of the deaths.

ANSWER: **lahars**

[10] It'd be pretty embarrassing if you couldn't outrun this usually slow-moving molten rock ejected during an eruption, but if it catches you you'll probably die. Its types include pahoehoe and a'a.

ANSWER: **lava**

[10] You don't have to be near the volcano to die, as evidenced by the eruption of this supervolcano 70,000 years ago. The resulting decade-long winter may have wiped out over half the human population, causing a bottleneck.

ANSWER: Lake **Toba** supervolcano

20. Australian officer Ted Serong heavily criticized this program, begun by Operation Sunrise, as basically identical to the failed French *agroville* plan from the 1950s. For 10 points each:

[10] Identify this counter-insurgency policy that sought to win its target population's hearts and minds by relocating people to new villages after a friendly forced-march and a neighborly burning of their previous homes.

ANSWER: The **Strategic Hamlet Program**

[10] The Strategic Hamlet Program wreaked havoc on the population of this country, at the time divided between Ngo Dinh Diem's South and Ho Chi Minh's North.

ANSWER: **Vietnam**

[10] Village relocation was also used by this country during its Bush War, which pitted its forces like the Selous Scouts against the ZANU and ZAPU. After the war, this country gave way to Zimbabwe.

ANSWER: **Rhodesia**