



IMSANITY 2
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-ROUND 1-

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Tossups

- (1) One character in this work tells of the bad deeds he has performed with the protagonist's father and grandfather, such as setting fire to an Indian village. The title character's wife's pink ribbon is caught on a branch before he realizes that the woman who taught him catechism, Goody Cloyse, is also traveling to the same place as other exemplary Christians, such as the minister Deacon Gookin. In an attempt to resist converting to "fiend worshipping," he cries out to look to heaven and "resist the wicked one" to his wife, Faith. For ten points, name this short story in which the title character dreams about sinning and human evil, a work by Nathaniel Hawthorne.

ANSWER: Young Goodman Brown

- (2) During this dynasty, the "Southerners" and "Northerners" were the lowest social classes, both under the semu class. It was the first dynasty to use paper money, and the capital was moved to Dadu during this dynasty. It was ended by forces led by Zhu Yuanzhang, who declared himself the Hongwu emperor, during the Red Turban Rebellion, which started the Ming dynasty. This dynasty attempted to conquer Japan, but the kamikaze helped stop their armies, which were led by the grandson of Genghis Khan. For ten points, name this Chinese dynasty ruled over by the Mongols which was founded by Kublai Khan.

ANSWER: Yuan dynasty

- (3) The real numbers can be defined as sets of these numbers called Dedekind cuts. Farey sequences consist of numbers of this type. Georg Cantor used a diagonalization argument to show that the set of these numbers and the set of natural numbers have the same size. Their namesake Root Theorem states that if an integer polynomial has a root of this type, then the constant and leading coefficient are respectively divisible by the numerator and denominator. Having terminating or repeating decimal expansions, for ten points, name this set of numbers, symbolized Q , which can be written as a quotient of two integers.

ANSWER: rational numbers (prompt on Q before mentioned)

- (4) Based on factors such as ring strain, Bredt's rule governs the formation of the bridgehead types of these compounds. These compounds are produced by the reaction of a carbonyl-containing compound with an ylide in the Wittig reaction. Another way to produce these compounds is through elimination reactions, examples of which include the dehydrohalogenation of alkyl halides. Zaitsev's rule predicts the products of reactions that produce these to give the more highly substituted ones of these. In the presence of a Lindlar catalyst, they can be produced from alkynes by addition of hydrogen. For ten points, name this kind of compound containing a carbon-carbon double bond, also known as olefins.

ANSWER: alkenes (accept olefins before mention)

- (5) He collaborated with Czerny in setting Bellini's "March of the Puritans" as the theme of his *Hexaméron*. An ode by Lamartine inspired one of his thirteen symphonic poems, and his most famous symphony is comprised of three character sketches, the second of which is entitled "Gretchen." He also composed a paraphrase on the Dies Irae melody known as the Totentanz. The "Mazeppa" is the fourth of his twelve *Transcendental Etudes*, while his most famous composition builds upon the Rákóczi March in the fifteenth of nineteen gypsy-inspired pieces. For ten points, name this virtuoso pianist and Romantic composer of the *Faust* symphony, *Les préludes*, and the *Hungarian Rhapsodies*.

ANSWER: Franz Liszt

- (6) The Itaipu Dam on this nation's southeastern border provides most of this nation's hydroelectric power and is shared with a country where Guarani is an official language. The Xingu people along the Tocantins river nearly died out in the 1960s, and this country's capital was moved to the northwest to a specially designed city in 1960. Mount Roraima is the highest point of this country's northern neighbor's namesake highlands, and the majority of the Pantanal wetlands lie along its border with a country that has two capitals. Only ten percent of this country's Atlantic Rainforest remains from when Pedro Cabral first sighted it. For ten points, name this only South American nation to speak Portuguese, through which the Amazon River flows.

ANSWER: Brazil (or Brasil)

- (7) Their dihedral angles can be visualized in a Ramachandran plot, and a reaction that leads to the synthesis of these compounds involves hydrolysis of the product of the Strecker Synthesis, a nitrile. Their charge is dependent on pH, and though they are not sugars, the homochirality problem addresses why the majority of these compounds are in the L configuration. Their side chains vary, and some include aromatic rings, such as tryptophan and tyrosine. They form peptide bonds in a dehydration synthesis reaction, and include compounds like proline, lysine, and glycine. For ten points, name these compounds consisting of an amino and carboxylic acid group, the building blocks of proteins.

ANSWER: amino acids

- (8) In one portion of this work, Alatiel sees nine men over four years before finally marrying the King of Algarve, while in another, Lisabetta dies after her brothers take a pot of basil with Lorenzo's head inside of it. The first story in this work is about a wrongdoer who confesses untruthfully to a friar during last rites. Gualteri feigns the death of his children to test the faithfulness of his wife, Griselda, in a story told by Dioneo, who never conforms to the day's storytelling themes. Focusing on seven women and three men escaping from the plague in Florence, for ten points, name this collection of one hundred tales written by Giovanni Boccaccio.

ANSWER: The Decameron (or Il Decameron)

- (9) This religion was made known to the public on the television broadcast *The Hate that Hate Produced*. One important object in this sect is a UFO that was seen and described in the Book of Ezekiel that is made of the “toughest steel” and costs fifteen billion dollars; that object is the Mother Plane. This sect, which was founded by Wallace Fard, claims that Dr. Yakub was the Original scientist who created humans and that the last prophet was Elijah Mohammed and not Muhammad. For ten points, name this religion which espouses black supremacy, currently led by Louis Farrakhan, whose most famous member was Malcolm X.

ANSWER: Nation of Islam (do not accept or prompt on “Islam”)

- (10) This election saw Oregon governor Lafayette Grover declare John Watts ineligible to be an elector. David Davis was elected to the Senate in Illinois and his resignation from the Supreme Court occurred shortly after this election. James Blaine suffered an upset at the Republican convention, and the Democratic candidate for president had prosecuted “Boss” Tweed. The Republican candidate, who earned the nickname “His Fraudulency”, promised to withdraw troops from the South, and an electoral commission awarded him a victory. For ten points, name this election that ended Reconstruction in which Rutherford B. Hayes defeated Samuel Tilden despite losing in the popular vote.

ANSWER: United States Presidential Election of 1876

- (11) This man recently rewrote parts of his book *No Apology*. This man said during a debate that he “can’t have illegals mowing his lawn since [he’s] running for office”, and he also told a group of unemployed voters in Florida that he was also unemployed. This candidate said that taxes cannot be raised on corporations since “Corporations are people”. Rick Perry said “I’m not in the betting business” after this candidate bet ten thousand dollars that he had never supported an individual healthcare mandate. For ten points, name this “flip-flopping” Republican Presidential candidate who instituted universal healthcare as Governor of Massachusetts.

ANSWER: Willard Mitt Romney

- (12) This artist painted a portrait of his son Jorge Manuel, and Pablo Picasso painted a variant of that portrait entitled *Portrait of a Painter After [this man]*. This artist’s son also appears at the front one of his works which features Saint Stephen and Saint Augustine laying the title figure to rest underneath a heavenly scene. This man painted the Alcantara bridge spanning the Tagus river, which sits below the San Servando castle and ominous clouds in a depiction of his hometown. For ten points, name this Spanish painter of *The Burial of the Count of Orgaz* and *View of Toledo* whose nickname refers to his Greek heritage.

ANSWER: El Greco or Domenikos Theotokopoulos

(13) In one work by this author, a doctor meets his future wife through a hole that is seven inches in diameter. In another work, one of his characters dreams about Ayesha leading her followers to drown crossing the Arabian Sea. That character, who is in love with Allie Cone and believes he is the angel Gabreel, is Farishta. Another of his novels features a character who loses his psychic powers after a sinus operation, Saleem Sinai, and many characters were born within an hour of India's independence. For ten points, name this Indian author who earned a fatwa with his *The Satanic Verses* and wrote *Midnight's Children*.

ANSWER: Salman Rushdie

(14) The Pound-Rebka experiment measured the redshift of light moving in a field created by this force. The Jeans instability is a result of insufficient gas pressure in interstellar gas clouds to counteract this force. Clusters of galaxies are capable of bending light from a source as it travels towards an observer, known as this force's namesake lensing. This phenomenon is responsible for maintaining the hydrostatic equilibrium of a star as it expels energy outwards from its core. Keeping the planets of the solar system in orbit, for ten points, name this fundamental force that acts on all objects with mass.

ANSWER: gravity (or gravitational force)

(15) This man's policy of "desatellization" was set back with the crushing of the Prague Spring only months after students protested in May 1968 against this man. The Secret Army Organization tried to assassinate this man after he signed the Évian Accords. This man provided aid to Biafra separatists in the Nigerian civil war, and proclaimed "Vive le Quebec libre!" during a visit to Montreal. This man succeeded René Coty's Fourth Republic during the Algerian Crisis. The leader of the Free French forces during World War II, for ten points, name this first president of the French Fifth Republic.

ANSWER: Charles André Joseph Marie de Gaulle

(16) A stable cluster of four of these particles was identified by Francisco-Miguel Marques. The mean lifetime of this subatomic particle in its free state is about fifteen minutes, and when it decays, a W- boson is emitted. Though they are not electrons, the Pauli exclusion principle explains these particles' namesake degeneracy pressure, which supports a stellar remnant made of mostly of these particles from collapsing in on itself. These particles also are responsible for splitting atoms in nuclear fission reactions. Consisting of two down quarks and one up quark, for ten points, name this atomic particle discovered by James Chadwick in 1932, the uncharged counterpart of the proton present in the nuclei of nearly all atoms.

ANSWER: neutron

(17) He's not Christopher Marlowe, but one poem by this author begins "Come with me and be my love" before promising "silken lines and silver hooks." This author compares the titular animal to marriage by noting that "it suck'd me first, and now sucks thee," causing their "two bloods" to "mingle." This poet of *The Bait* and *The Flea* also wrote "thy firmness makes my circle just" in a poem that compares two lovers to "stiff twin compasses." In yet another poem, he called a certain concept "slave to Fate, Chance, kings and desperate men." For ten points, name this Metaphysical poet of *A Valediction: Forbidding Mourning* and Holy Sonnet X, *Death, be not proud*.

ANSWER: John Donne

(18) In response to Thomas Carlyle, this thinker wrote an anonymous letter later to be known as "The Negro Letter." The method of residue and method of concomitant variations are part of five reasoning principles known as this man's methods which are outlined in his *A System of Logic*. He proposed a "perfect equality" between men and women in a work co-written with his wife, Harriet Taylor, *The Subjection of Women*. He asserted that power should be used only to prevent harm to individuals in his "harm principle." For ten points, name this proponent of the "greatest happiness principle," author of *On Liberty* and *Utilitarianism*.

ANSWER: John Stuart Mill

(19) Edvard Munch created two versions of this painting, one of which shows the title character lying on a bed next to a nude woman. The top half of this scene is dominated by a black wall and a wooden stand in the right foreground holds an inkwell. A bloodied knife lies on the floor, and a wooden stand bears the names of both the central figure and the artist. The central figure holds a quill in his right hand and lies slumped over in a bathtub with a note in his left hand. For ten points, name this painting depicting the murder by Charlotte Corday of the title character, a work by Jacques Louis David.

ANSWER: Death of Marat (or La Mort de Marat)

(20) This figure kills the giant Tityus when he attacks this figure's mother. After this figure loses a music contest to a satyr, he flays Marsyas alive. This figure has to serve King Admetos for a year after he kills the Cyclops who forged the lightning bolt that kills this figure's son, and that son raises Hippolytus from the dead and is named Asclepius. After this figure slays a python, he becomes the patron god for the Oracle at Delphi. One of this figure's love interests escapes him by turning into a laurel tree; that lover is Daphne. He slaughters the children of Niobe along with his sister Artemis. The son of Zeus and Leto, for ten points, name this Greek god of light, truth, and the arts.

ANSWER: Apollo

- (21) This author wrote that “I may return/If dissatisfied/With what I learn/From having died” in his poem *AWAY!*. This poet wrote of “leaf [subsiding] to leaf / So Eden sank to grief” and nature’s “hardest hue to hold” in another poem. He considered the development of the American spirit, noting that “The land was ours before we were the land’s” in another poem; those poems are *Nothing Gold Can Stay* and *The Gift Outright*. For ten points, name this American poet best-known for *Fire and Ice*, *Mending Wall*, and for choosing “the one less travelled by” in *The Road Not Taken*.

ANSWER: Robert Lee Frost

Bonuses

(1) This country's economy suffered from a Tulip bulb crash. For ten points each:

△ [10] Name this country with capital at Amsterdam that is protected by dikes.

△ **ANSWER:** Kingdom of the Netherlands

▽ [10] This is the name for the Dutch War of Independence against Phillip II of Spain. It was provoked by the Council of Troubles, and ended with the Peace of Münster.

▽ **ANSWER:** Eighty Years War

[10] This Dutch nobleman led the revolt in the Netherlands that began the Eighty Years War. He was assassinated in 1584 by Balthasar Gérard.

ANSWER: William of Orange or William the Silent or William I

(2) Answer the following about the 2011 Nobel Prizes for ten points each:

△ [10] The Prize in Literature was awarded to Tomas Tranströmer, a poet from this nation, the home country of Alfred Nobel in whose capital of Stockholm the Prize was presented.

▽ **ANSWER:** Kingdom of Sweden

[10] The Peace Prize was shared among three women, one of whom, Ellen Johnson Sirleaf, received the award in part for her efforts with then-President Charles Taylor to resolve this nation's second Civil War in 2003. She is currently President of this nation with capital at Monrovia.

ANSWER: Republic of Liberia

[10] In a controversial breach of policy, the Prize in this field was awarded three days posthumously to Ralph Steinman.

ANSWER: physiology or medicine

(3) The work of Cornelius Agrippa and Albertus Magnus inspires the title character, who studies at the University of Ingolstadt. For ten points each:

△ [10] Name this work which features an eight-foot tall character killing the protagonist's friend Henry Clerval in order to exact revenge on the title character. It is presented in the

▽ form of letters from Robert Walton to his sister.

ANSWER: Frankenstein, or, the Modern Prometheus

[10] This author of *Frankenstein* also wrote an apocalyptic science fiction novel *The Last Man*.

ANSWER: Mary Shelley (or Mary Wollstonecraft Godwin)

[10] This character in *Frankenstein* is the adopted sister of Victor Frankenstein. Victor nurses her back to health from the scarlet fever and she is eventually killed by Frankenstein's monster after marrying Victor.

ANSWER: Elizabeth Lavenza

(4) His work unified fields of electricity and magnetism, as he demonstrated that these are both a consequence of electromagnetic fields. For ten points each:



[10] Name this Scottish scientist whose four namesake equations include Ampere’s law.



ANSWER: James Clerk Maxwell

[10] These theories attempt to merge all three of the Standard Model’s gauge interactions, demonstrating that they all are one phenomenon. They differ from the Theories of Everything because they do not seek to unify gravity and quantum mechanics.

ANSWER: Grand Unified Theories

[10] The existence of this particle with magnetic charge is proved impossible by one of Maxwell’s laws, which tells that the divergence of the *B* field equals zero.

ANSWER: magnetic monopoles (prompt on partial answer)

(5) This work inspired *The Three Shades* and *Ugolino and his Children*. For ten points each:



[10] Name this work which represents scenes from Dante’s *Inferno*. Its sculptor’s most famous work sits atop of the door panels.



ANSWER: The Gates of Hell (or La Porte de l’Enfer)

[10] This sculptor of *The Gates of Hell* also created *The Thinker* and depicted a scene from the Hundred Years’ War in *The Burgers of Calais*.

ANSWER: Auguste Rodin

[10] Many of Rodin’s contemporaries attempted to discredit him by claiming that this work was cast from a living model. It is cast in the titular material and depicts a nude man with one hand on his head.

ANSWER: Age of Bronze (or Bronze Age or L’Âge d’airain)

(6) He claimed that “love is short, forgetting so long” and included his “Hymn to Celery” in his *Residence on Earth*. For ten points each:



[10] Identify this Chilean poet who included “The Heights of Machu Picchu” in his *Canto General*.



ANSWER: Pablo Neruda

[10] Neruda is probably most famous for this collection of twenty-one poems which concludes with a poem that says “The memory of you emerges from the night around me.”

ANSWER: Twenty Love Poems and a Song of Despair
(or Veinte poemas de amor y una canción desesperada)

[10] One poem in this collection by Neruda describes a “large tuna in the market.” Other poems are addressed to ordinary objects, like salt, socks, and tomatoes.

ANSWER: Elemental Odes (or Odas Elementales)

(7) Early tables of these mathematical entities were computed using prosthaphaeresis. For ten points each:



[10] Name these functions, the inverses of exponential functions.



ANSWER: logarithms

[10] Equal to e for a natural logarithm and 10 for a common logarithm, this number raised to the power of a logarithm gives the input to the logarithm.

ANSWER: base

[10] This Scottish mathematician was the first to introduce logarithms. He later worked with Henry Briggs to improve their theory.

ANSWER: John Napier

(8) It ended when the Council of Constance removed both Gregory XII and Benedict XIII. For ten points each:



[10] Name this 1378 to 1417 dispute that followed the Babylonian Captivity, during which there were two popes.



ANSWER: Great Schism (or Western Schism)

[10] During the Great Schism, one of the popes was in Rome, while the other pope was in this city. The influence the French King exerted over the pope in this city led to a loss of prestige of the papacy.

ANSWER: Avignon

[10] The other great schism occurred between the Roman Catholic Church and this church that was led by the Patriarch of Constantinople.

ANSWER: Eastern Orthodox Church

(9) After Oedipus blinded himself, he cursed his sons to fight over control of this city, leading to the deaths of Eteocles and Polyneices on the battlefield and Antigone in burying Polyneices. For ten points each:



[10] Name this city which Polyneices and six others fought to take, ignoring the warnings of the blind prophet Tiresias.



ANSWER: Thebes

[10] This man, the brother of Europa and husband of Harmonia, founded Thebes where a cow lay down exhausted.

ANSWER: Cadmus

[10] Cadmus planted these objects, which grew into fully grown warriors, five of which helped him build Thebes. Jason also planted these objects and fought off the resulting warriors with Medea's help.

ANSWER: dragon's teeth (prompt on partial answer)

- (10) Identify the following psychologists who studied types of human development for ten points each:



[10] This Swiss psychologist separated cognitive development into sensorimotor, preoperational, concrete operational, and formal operational stages. His concept of object permanence is a critical breakthrough of the sensorimotor stage.

ANSWER: Jean Piaget

[10] This man defined identity crisis as the “failure to achieve ego identity during adolescence” and created an eight-stage model of social development wherein individuals seek to acquire virtues.

ANSWER: Erik Erikson

[10] This American defined a six-stage model of moral development ranging from the pre-conventional obedience to the post-conventional universality.

ANSWER: Lawrence Kohlberg

- (11) The habitable zone of a planet refers to the distance at which a planet can orbit a star and have the liquid form of this molecule on it. For ten points each:



[10] Name this molecule with maximum density at approximately 4 degrees Celsius.



ANSWER: water (or H₂O)

[10] This property of water allows water striders to walk on it. This property is responsible for water forming beads, and surfactants decrease the strength of this property.

ANSWER: surface tension

[10] Surface tension is equivalent to this quantity divided by the surface area. For an electrochemical cell, the standard value of this quantity is equal to the negative number of moles of electrons per mole of product times Faraday’s constant times the electrode potential.

ANSWER: Gibbs free energy

- (12) This work was secretly called *The Malediction* by its composer, and its eventual title came from the name of the hunchbacked protagonist. For ten points each:



[10] Name this opera in which a court jester hires Sparafucile to kill the womanizing Duke of Mantua but loses his daughter Gilda by her act of self-sacrifice instead.



ANSWER: Rigoletto

[10] Rigoletto is an opera by this Italian composer of other operas such as *Il trovatore* and *Aida*.

ANSWER: Giuseppe Verdi

[10] The Duke of Mantua sings this aria in *Rigoletto* that ironically complains about how fickle women are. Its offstage reprise in the last act causes Rigoletto to realize that the body in a sack is not of the Duke but that of Gilda.

ANSWER: La donna è mobile

(13) Answer the following about shirts for ten points each.

△ [10] The blackshirts were supporters of this fascist dictator of Italy during World War II.

▽ **ANSWER:** Benito Mussolini

▽ [10] This leader of the redshirts conquered the Kingdom of the Two Sicilies in the Expedition of the Thousand, aiding in the unification of Italy.

ANSWER: Giuseppe Garibaldi

[10] Garibaldi led forces against Juan Manuel de Rosas, a dictator of this nation. The Descamisados, or “shirtless ones”, were supporters of another leader of this nation.

ANSWER: Argentina

(14) It was inspired by Deuteronomy 32:35: “Their foot shall slide in due time.” For ten points each:

△ [10] Name this fire-and-brimstone sermon by Jonathan Edwards which concluded by pleading to “Let every one fly out of Sodom”.

▽ **ANSWER:** Sinners in the Hands of an Angry God

[10] *Sinners in the Hands of an Angry God* was delivered in Enfield, Connecticut in 1741 during this American theological period, inspired by preacher George Whitefield, which encouraged Christians to reconsider their own faith.

ANSWER: First Great Awakening

[10] In *Sinners in the Hands of an Angry God*, Edwards warned that God will show how terrible his wrath is, as did this Babylonian king when he committed Shadrach, Meshach, and Abednego to the fiery furnace.

ANSWER: Nebuchadnezzar II

(15) One nurse rubs her face with her crucifix in the hopes of making her birthmark go away, and the entire ward sits down and stares at a blank TV after being unable to watch the World Series. For ten points each:

△ [10] Name this novel in which the narrator, Chief Bromden, relates a patient’s attempts to rattle Nurse Ratched.

▽ **ANSWER:** One Flew Over the Cuckoo’s Nest

[10] *One Flew Over the Cuckoo’s Nest* is a work by this author who also wrote about the Stamper family in *Sometimes a Great Notion*.

ANSWER: Ken Kesey

[10] The protagonist of *One Flew Over the Cuckoo’s Nest* was this patient who constantly antagonizes Nurse Ratched and is eventually lobotomized and smothered to death by Bromden.

ANSWER: Randle Patrick McMurphy

(16) A study declassified in 2005 concluded that false radar images were responsible for the second incident. For ten points each:



[10] This incident occurred when the USS Maddox engaged North Vietnamese ships and falsely claimed to have reengaged them two days later. It prompted a namesake resolution that gave President Johnson the power to intervene in Vietnam.



ANSWER: Gulf of Tonkin Incident or Tonkin Gulf Incident

[10] The North Vietnamese launched this 1968 offensive, designed to end the war, on the Vietnamese New Year. It failed, but led to a general sentiment that the United States could not win the war.

ANSWER: Tet Offensive

[10] This general led United States forces in Vietnam from 1964 to 1968, including the time of the Tet Offensive. He talked about “positive indicators” and pushed to expand the war into Cambodia and Laos.

ANSWER: William Westmoreland

(17) All living cells contain chromosomes which contain the genetic material that codes for the body proteins. For ten points each:



[10] Name this subunit of chromosomes which is made up of four types of nitrogenous bases, a sugar, and a phosphate group. It forms a double helix, as discovered by Watson and Crick.



ANSWER: DNA or Deoxyribonucleic Acid

[10] This type of DNA, also called “jumping genes”, can be copied and placed in or moved to different regions of the genome in a cell. There are two classes of them, and they can cause hemophilia, SCIDs, and Duchenne muscular dystrophy.

ANSWER: transposons or transposable elements

[10] This woman was awarded the Nobel Prize in Medicine or Physiology in 1983 for the discovery of transposons, even though her experiments on maize which showed their existence were conducted in the 1940’s and 1950’s.

ANSWER: Barbara McClintock

(18) One character’s last words are “The horror! The horror,” although another lies and tells his fiancée he died saying her name. For ten points each:



[10] Identify this novella in which Marlow goes on a voyage up the Congo river to find the trader Kurtz.



ANSWER: Heart of Darkness

[10] *Heart of Darkness* was written by this author who also wrote about Giovanni Fidanza hiding silver on an island and being shot when he tries to retrieve it, *Nostromo*.

ANSWER: Joseph Conrad

[10] This Conrad work follows the titular character losing his daughter Nina to a Malay prince named Dain and moving to an empty trading house.

ANSWER: Almayer’s Folly

(19) Name the following about classical music and Spain for ten points each:

△ [10] Although he was not Spanish, Nikolai Rimsky-Korsakov wrote this orchestral work based on Spanish folk tunes and Asturian dances. Notable movements include the alborada and the fandango asutriano.

▽ **ANSWER:** Capriccio espagnol

[10] This Andalusian is most famous for depicting in a ritual fire dance in the ballet *El amor brujo* as well as a magistrate infatuated with a miller's wife in another ballet, *The Three-Cornered Hat*.

ANSWER: Manuel de Falla

[10] This Navarrese violinist composed a number of virtuosic pieces such as *Zigeunerweisen* and a *Carmen Fantasy*. Camille Saint-Saëns notably wrote his *Introduction et Rondo capriccioso* for this violinist.

ANSWER: Pablo de Sarasate

(20) These can be used to algebraically define rotations and reflections. For ten points each:

△ [10] Name these two-dimensional arrays of numbers arranged in rows and columns.

▽ **ANSWER:** matrix

▽ [10] This is the name for a matrix with all ones in its main diagonal and zeroes in all other entries. Whenever another matrix is multiplied by this, the result is the original matrix.

ANSWER: identity matrix

[10] For a matrix A , this is the name given to a vector v such that A times v is parallel to v . They are often found by trying to invert A minus an identity matrix.

ANSWER: eigenvector

(21) These can be computed for non-integers using the gamma function. For ten points each:

△ [10] Identify this function, denoted by an exclamation mark, which, for a positive integer n , equals the product of all integers between one and n , inclusive.

▽ **ANSWER:** factorial

[10] The factorial function can be defined iteratively using this process which relates n factorial to n minus one factorial. Specifically, n factorial equals one if n is zero and equals n minus one factorial times n if n is positive.

ANSWER: induction or recursion (accept word forms)

[10] This formula states that n factorial is approximately equal to the fraction n over e to the n th power times the square root of two pi n .

ANSWER: Stirling's Formula