

Louis M. Edwards Mathematics Super Bowl
Valencia Community College -- April 19, 2002

Practice Round

1. At Wakeel's Pizza Emporium, large pizzas (14" diameter round) cost \$9.99, extra large pizzas (16" diameter round) cost \$13.99 and super large pizzas (18" diameter round) cost \$16.99. What is the cost per square inch (to the nearest tenth of a cent) of the most economical pizzas to feed a large crowd?



Answer _____ cents/sq. inch

2. A circular sector has area A . If the radius is doubled without changing the central angle, what will the new area be?

Answer _____

3. Suppose p and q are two statements in fuzzy logic, then
- a.) the truth value of $\sim p = 1 -$ the truth value of p
 - b.) the truth value of $\sim q = 1 -$ the truth value of q
 - c.) the truth value of the disjunction of p and q (written $p \vee q$) = the maximum of the truth values of p and q
 - d.) the truth value of the conjunction of p and q (written $p \wedge q$) = the minimum of the truth values of p and q

Find the truth value of the statement "Foreign-made cars have high resale value, but it is not true that, they are safer or cost more than domestic cars," given the following the truth values of the statements below:

Foreign cars have high resale value (truth value = 0.85)

Foreign cars are safer than domestic cars (truth value = 0.73)

Foreign cars cost more than domestic cars (truth value = 0.60)

Answer _____

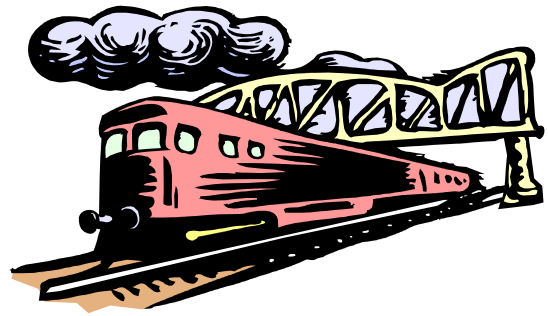
Louis M. Edwards Mathematics Super Bowl
Valencia Community College -- April 19, 2002

Round One

1. For how many values of k does the graph of $y = 3x^2 + kx + 7$ have its vertex on the x-axis?

Answer _____

2. James and Jim are $\frac{3}{5}$ of the way through a mile-long tunnel when they hear a train approaching from ahead. In a panic, they take off running, but in opposite directions. Jim heads for the near end of the tunnel, averaging 13 mph, while James heads back to the far end, averaging 11 mph. The train, traveling at a constant speed, roars by each of them just as they escape from the tunnel. What was the speed of the train to the nearest mph?



Answer _____

3. What is the probability that a randomly chosen integer contained in the interval $(-7.5, 7.5)$ satisfies $x^2 > x + 6$?

Answer _____

Louis M. Edwards Mathematics Super Bowl
Valencia Community College -- April 19, 2002

Round Two

1. If the two zeros of a quadratic function P are m and n , and $P(0) = k$, then what is the value of $P(r)$?

Answer _____

2. There are twelve students in a class including Louise and Raul. Louise and Raul must sit together in the front row that has eight seats. How many orders are possible for a filled front row?



Answer _____

3. Suppose that when money is spent in an economy, 80% of the amount spent is re-spent in the economy and 20% is saved. For example, if \$100 million is spent then \$80 million is re-spent. Then that \$80 million in spending generates another round of spending and 80% of the \$80 million is spent. If this condition continues indefinitely, what is the total amount of spending in this example that results including the initial \$100 million?



Answer \$ _____ Million

**Louis M. Edwards Mathematics Super Bowl
Valencia Community College -- April 19, 2002**

Round Three

1. What 50 coins, choosing only from pennies, nickels and dimes add to give \$1.00?



_____ pennies

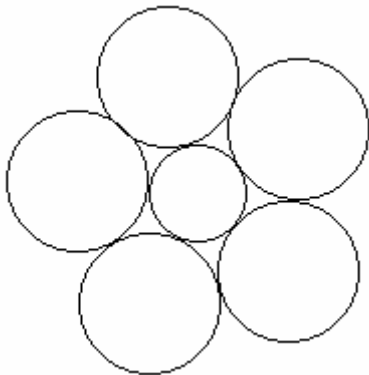
_____ nickels

_____ dimes

2. Find the average rate of change, rounded to the nearest thousandth, of $y = \log_2(3x + 4)$ as x changes from five to nine.

Answer _____

3. Five circles with equal radii are situated in a plane so that each is tangent to two others and is externally tangent to a unit circle. What is the radius of each of the five circles, rounded to two decimal places?

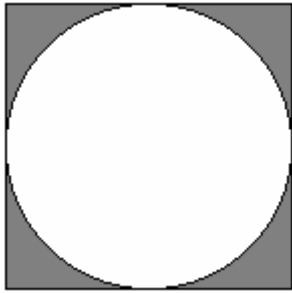


Answer _____

**Louis M. Edwards Mathematics Super Bowl
Valencia Community College -- April 19, 2002**

Round Four

1. Given that darts randomly strike the square board with a circular center region shown, what is the probability that the next dart strikes the shaded area?

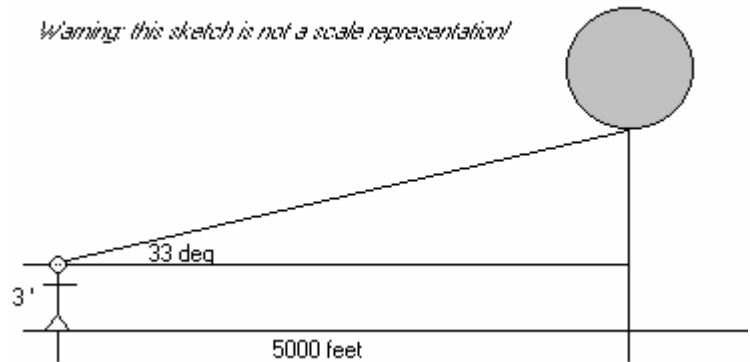


Answer _____

2. $S(n)$ is defined to be the smallest positive integer which is divisible by integers 1, 2, 3, ... n. What is the value of $S(10)$?

Answer _____

3. Maggie Simons is tall enough so that her eye is 3 feet above the ground when she is standing. From her eye level she sights a tethered balloon at an estimated 33-degree angle of elevation. She also estimates she is standing a horizontal distance of 5000 feet from the ground tether point of the balloon. Using trigonometry, Maggie estimates the height of the balloon. If there were possible errors in the angle measure and distance of $\pm 2\%$, what would be her maximum height error to the nearest foot?



Answer _____

**Louis M. Edwards Mathematics Super Bowl
Valencia Community College -- April 19, 2002**

Round Five

1. Going into the last game of the season, a basketball team had averaged 83.8 points per game. In their last game, they scored 97 points, raising their season average to 84.2 points per game. How many games did they play in their season?

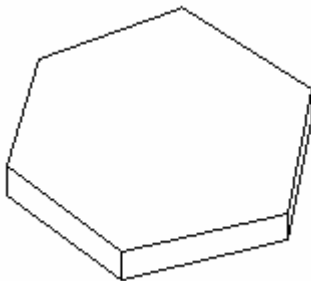


Answer _____ games

2. How many positive integers less than 1000 are neither divisible by 5 nor by 7?

Answer _____

3. Debbie plans to build a hummingbird aviary with a concrete floor shaped like a regular hexagon. Each side will measure 8 feet and the floor will be 4 inches deep. How many cubic yards of mixed concrete are needed? Assume that Debbie can only buy mixed concrete in half cubic yards or whole cubic yards.



Answer _____ cubic yards

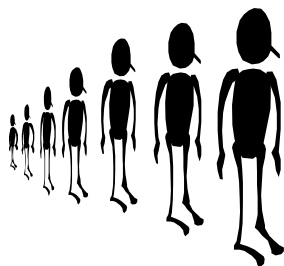
**Louis M. Edwards Mathematics Super Bowl
Valencia Community College -- April 19, 2002**

Round Six

1. A circle has center $(6, 7)$. Find the area of the triangle formed by the coordinate axes and the tangent line to the circle at the point $(2, 5)$ on the circle.

Answer _____ sq. units

2. Suppose that the population of Saltville grew at a constant rate over a ten-year period and is 20% higher now than ten years ago. What was the annual percentage growth rate to the nearest tenth of a percent?



Answer _____ %

3. The following facts are known to be true about Jolene:

- If Jolene goes out on Friday night and not Saturday night, then she does not study.
- If Jolene does not fail mathematics, then she must have studied.
- If Jolene does not go out on Friday night, then she watches a movie.
- Jolene does not watch a movie and she does not fail mathematics.

Which nights did Jolene go out?

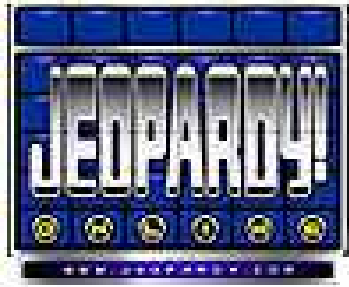
- A. Friday Night Only
- B. Saturday Night Only
- C. Neither Night
- D. Both Nights

Answer _____

Louis M. Edwards Mathematics Super Bowl Valencia Community College -- April 19, 2002

Group Round

For this group round in addition to the points awarded for correct answers, the team with the most correct answers receives a bonus of three points, the team with the next most correct answers receives a bonus of two points and the team with the third most correct answers receives a bonus of one point. If multiple teams have an equal number of correct answers the tie is broken by which team completed the round in the lesser/least amount of time.



In the television show Jeopardy, the last round called “Final Jeopardy” requires the contestants to bet some proportion of their winnings, to that point, on whether they can determine the “Final Jeopardy Question”. Contestants correctly identifying the question add the bet amount to their total. Contestants incorrectly identifying the question subtract the bet amount from their total. Only the contestant with the highest total gets to keep their winnings at the conclusion of the game and return to play again the next day. The second place and third place contestants get prizes worth approximately \$2000 and \$1000 respectively and go home.

In an effort to plan the best strategy for betting in the Final Jeopardy round, for the day you get to be on the show you have made the following assumptions.

- 1.) After seeing the category, you will consider your chance of correctly identifying the question to be 90% (if you think it is an easy category) or 30% (if you think it is a hard category).
- 2.) Since you are unsure what are hard or easy categories for your opponents, you will always assume that they have a 60% chance of correctly identifying the question.
- 3.) Since they are probably pretty intelligent, you assume your opponents have gone through a process similar to yours to determine betting strategies and will wager strategically based on it.

In a typical game the leader has approximately \$15,000, the second place contestant \$11,000 and the third place contestant \$6,000. For one point each, identify a strategically optimal amount to bet for the situation described above given the follow conditions:

- | | |
|---|---------------|
| a.) You think the category is easy and you are in first place. | a.) \$ _____. |
| b.) You think the category is hard and you are in first place. | b.) \$ _____. |
| c.) You think the category is easy and you are in second place. | c.) \$ _____. |
| d.) You think the category is hard and you are in second place. | d.) \$ _____. |
| e.) You think the category is easy and you are in third place. | e.) \$ _____. |
| f.) You think the category is hard and you are in third place. | f.) \$ _____. |

Now that you have determined your optimal betting strategy, for one point each, complete the following Jeopardy questions given the clue:

- A Swiss mathematician noted for solving the Koenigsberg bridge problem.
Who was _____?
- A Russian mathematician noted for developing a Non-Euclidian geometry based upon a pseudosphere.
Who was _____?
- The name of a famous graph theory problem involving a minimally weighted Hamilton circuit or less frequent flier miles in business class.
What is the _____?