SAMPLE PROBLEMS – HIGH SCHOOL PRAXIS II

1. Find the volume of a pyramid having slant height 5 and a base that is a square with side 8.

A. 64
B. 106.67
C. 320
D. 576

2. Approximate the value of $(\log_3 4) * (\log_4 5)$

A. 1.1
B. 1.3
C. 1.5
D. 1.7

3. Which of the following is a focus of the ellipse $9x^2 - 18x + 25y^2 - 50y = 191$?

A. (1,-5) and (1,3)
B. (1,4) and (1,-2)
C. (4,1) and (-2,1)
D. (5,1) and (-3,1)

4. Given the following stem-and-leaf plot, what is the median?

STEM	LEAF
9	2
8	3, 9
7	2, 8
6	1, 3, 4, 7
5	0, 2, 3, 4, 7
4	4, 4, 5, 6
3	1, 3, 9
2	1, 5
1	0, 7, 8

A. 50
B. 51
C. 52
D. 53

5. Let $f(x) = x^2$, and let $x_0 = 1$. Use Newton's iterative method to estimate the root after two iterations.

A. 0

B. .125
C. .25
D. .5

6. A room is 14 feet long by 20 feet wide by 8 feet tall, and it has two windows that are each 3 feet by 5 feet. Assume a gallon of paint covers 350 square feet, and paint costs $40 per gallon or $15 per quart.

What is the smallest cost of paint to paint the room, including the ceiling? (Do not paint the windows or the floor!)

A. $80
B. $95
C. $110
D. $120

7. A car company advertises its new hybrid vehicle as getting on average 50 miles per gallon, with a standard deviation of 5 miles per gallon. If mileage for the hybrid is normally distributed, approximately what is the probability that your car will get more than 60 miles per gallon?

A. 1%
B. 2.5%
C. 5%
D. 10%

8. Calculate the zeros of $x^3 - 5x^2 - 44x - 60$.

A. −10, -3, 2
B. −5, -4, 3
C. -4, -3, 5
D. -3, -2, 10

9. Let S be the following statement: If Mary is wearing red lipstick at 5 pm, then she has a date that night. Assume S is true. Which of the following is also true?

A. If Mary is not wearing red lipstick at 5 pm, then she does not have a date that night.
B. If Mary has a date that night, then she is wearing red lipstick at 5 pm.
C. If Mary does not have a date that night, then she is not wearing red lipstick at 5 pm.
D. If Mary is wearing pink lipstick at 5 pm, then she does not have a date that night.

10. Find the inverse of the function $y = f(x) = (x - 1) / (x + 1)$.

A. $y = (x - 1) / (x + 1)$
B. $y = (x + 1) / (x - 1)$
C. $y = -(x + 1) / (x - 1)$
D. $y = -(x + 1) / (1 - x)$

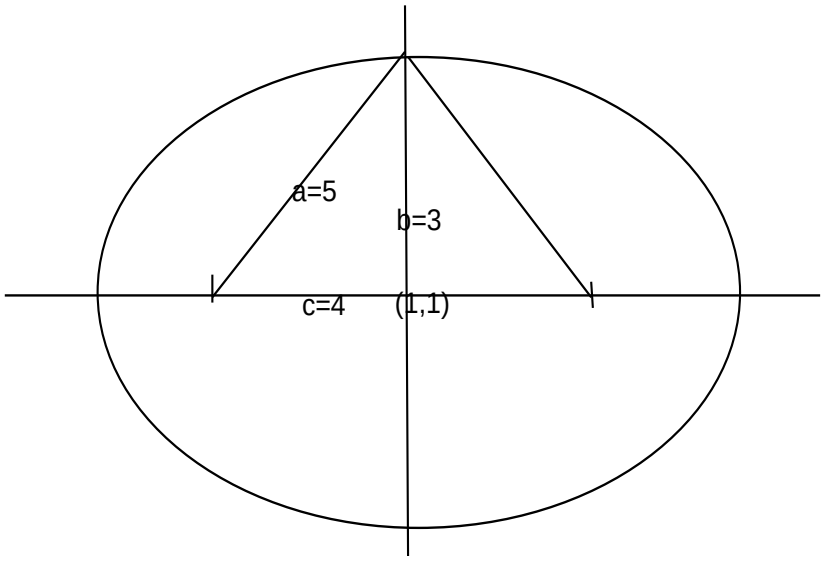
SUGGESTED ANSWERS

1. Answer: A.
V = (1/3)(area of base)(height). Area of base = 8*8=64.
The slant height S is the hypotenuse of a right triangle with legs h = height of pyramid, and r = radius of a circle inscribed in the square base.
$S^2 = h^2 + r^2$, $5^2 = h^2 + (8/2)^2$, h = 3.
V = (1/3)(64)(3) = 64.

2. Answer: C.
$\log_a b = \log_x b / \log_x a$ for any x. Choose x=10 or x=e, and use your calculator.

$(\log 4 / \log 3) * (\log 5 / \log 4) = (\log_{10} 5 / \log_{10} 3) = .699/.477 = 1.465$; the closest answer is 1.5

3. Answer: D.
Complete the squares of both x and y:
$9(x^2 - 2x) + 25(y^2 - 2y) = 191$
$9(x^2 - 2x + 1) + 25(y^2 - 2y + 1) = 191 + 9 + 25$; don't forget the 9 and 25 terms.
$9(x - 1)^2 + 25(y - 1)^2 = 225$



$[(x - 1)^2]/(5^2) + [(y - 1)^2]/(3^2) = 1$
This ellipse has center (1,1); a = 5, b = 3. $a^2 = b^2 + c^2$, c = 4.
Since a>b, major axis is horizontal, going through center at y = 1.

Foci are on major axis at distance c from center (1,1).
Foci are (5,1) and (-3,1).

4. Answer: B.
This question requires that you recognize the numbers in the stem-and-leaf plot are 92, 83, 89, etc. and that they are ranked for you, that you count that there are 26 numbers, and that you recall the median for an even set of numbers is the average of the two middle numbers. The 13^{th} smallest number is 50, the 14^{th} smallest number is 52, and so the median is 51.

5. Answer: C.
$x_{n+1} = x_n - f(x_n)/f'(x_n)$ $\quad$ $f(x) = x^2$, $f'(x) = 2x$

$x_1 = x_0 - f(x_0)/f'(x_0) = 1 - f(1)/f'(1) = 1 - 1/2 = 1/2.$
$x_2 = x_1 - f(x_1)/f'(x_1) = 1/2 - f(1/2)/f'(1/2) = 1/2 - (1/4)/(1) = 1/4.$

6. Answer: C.
A gallon of paint covers 350 square feet, and 1 quart = 1/4 gallon covers (1/4)*350 = 87.5 square feet.

The ceiling is 14*20 = 280 square feet.
Two walls are 14*8 each: 2*14*8 = 224 square feet.
Two walls are 20*8 each: 2*20*8 = 320 square feet.
Subtract two windows at 3*5 each: 2*3*5 = 30 square feet.
280 + 224 + 320 - 30 = 794 feet.

Two gallons of paint cost $80 and cover 700 square feet.
Two quarts of paint cost $30 and cover 175 feet.
Answer: $80 + 30 = $110
(Note that two gallons plus one quart is not enough paint, and a third gallon is more expensive.)

7. Answer: B.
You should know for the exam that with the normal distribution: the probability is about 68% that observations are within plus or minus one standard deviation of the mean, the probability is about 95% that observations are within plus or minus two standard deviations of the mean, and the probability is about 99.7% that observations are within plus or minus three standard deviations of the mean.

60 miles per hour is two standard deviations greater than the mean of 50. The probability is about 95% that observations are within plus or minus two standard deviations of the mean, so the probability is 5% that observations are outside of plus or minus two standard deviations of the mean. Of this 5%, half are on the lower side and half are on the upper side.

8. Answer: D.
If you are good at factoring then by trial and error you can find that $x^3 - 5x^2 - 44x - 60 = (x+2)(x+3)(x-10)$. Or, you can plug all answers into the expression and see what checks. I think more efficient is to use the graphing calculator. Click the MyGraphs icon, click New, enter x^3-5x^2-44x-60, click OK. Click Window, Xmin=-10, Xmax=15, Ymin=-50, Ymax=15, OK, Graph. Then click Analysis, Zero, move the cursor to the left of the first zero, drag to the right of the first zero, and release. The output shows x=-3, y=0. Then click Graph, Analysis, Zero, move the cursor to the right of the first zero but to the left

of the second zero, drag to the right of the second zero, and release. The output shows x=-2, y=0. Then click Graph, Analysis, Zero, move the cursor to the right of the second zero but to the left of the third zero, drag to the right of the second zero, and release. The output shows x=10, y=0. Note that using Solver only finds one zero.

9. Answer: C.
A is the inverse. B is the converse. C is the contrapositive to statement S; a statement and its contrapositive are both true or both false. D is not supported by the assumption of S or by logic.

10. Answer: C.
Solve for x, then interchange and y:
$y = (x - 1) / (x + 1)$
$(x + 1)y = (x - 1)$
$xy + y - x = -1$
$x(y - 1) = -1 - y$
$x = (-1 - y)/(y - 1)$

Interchange x and y:
$f^{-1} = y = (-1 - x)/(x - 1) = (x + 1) / (1 - x)$.
Check: $f(f^{-1}) = [(x+1)/(1-x) - 1] / [(x+1)/(1-x) + 1]$
$= [2x/(1-x)] / [2/(1-x)] = x$.

Check: $(f^{-1})(f) = [(x-1)/(x+1) + 1] / [1 - (x-1)/(x+1)]$
$= [2x/(x+1)] / [2/(x+1)] = x$.