

2009 ACTM State Algebra II Exam

April 25, 2009

Circle the correct answer and mark it on the answer sheet.

- You receive a monthly salary of \$2400 plus a commission of 20% of sales. If you receive \$3100 in wages for May, what were your sales for that month?
 - \$5500
 - \$3500
 - \$2400
 - \$3020
- Solve the equation for x: $\frac{-1}{2-x} = \frac{3}{x+2} - \frac{6x}{x^2-4}$
 - 2
 - 2
 - all reals
 - no solution
- Solve the equation for x: $\sqrt{2x+6} - \sqrt{x+4} = 1$
 - 3, 5
 - 5
 - 3
 - no solution
- Solve the equation for x: $\frac{2x-7}{x-5} \leq 3$
 - $(-\infty, 5) \cup [8, \infty)$
 - $[8, \infty)$
 - $(-\infty, 8)$
 - $(5, 8]$
- A projectile is fired straight upward from ground level with an initial velocity of 384 feet per second. During what time period will its height exceed 2000 feet? $h(t) = -16t^2 + 384t$
 - after 7.64 sec.
 - after 16.36 sec.
 - from 0 to 16.36 s
 - from 7.64 to 16.36 s
- A function is even if $f(x) = f(-x)$ for all x in the domain. Determine if the function h is even or odd. $h(x) = x^3 - 4$
 - even
 - odd
 - neither
 - both
- Given $f(x) = x + 2$ and $g(x) = 4 - x^2$, find $g(f(x))$.
 - $-x^2 + 6$
 - $-x^2 - 4x$
 - $6 + x - x^2$
 - $8 + 4x - 2x^2 - x^3$
- Which of the following is the inverse of $f(x) = 2x^3 - 1$?
 - $f^{-1}(x) = \frac{1}{2}x^3 + 1$
 - $f^{-1}(x) = \sqrt[3]{\frac{x-1}{2}}$
 - $f^{-1}(x) = \sqrt[3]{\frac{x+1}{2}}$
 - $f^{-1}(x) = \sqrt[3]{2x+1}$
- Find an equation for the parabola that has its vertex at (1,2) and passes through the point (0,0).
 - $y = 2x^2$
 - $y = -2x^2 - 4x$
 - $y = -2x^2 + 4x$
 - $y = -2x^2 - x$
- Find $(a + bi)(c + di)$.
 - $(ac - bd) + (ad + bc)i$
 - $(ac + bd) + (ad + bc)i$
 - $ac + bdi$
 - $(ac - bd) - (ad + bc)i$

11. Find **all** the zeros of $f(x) = x^5 + x^3 + 2x^2 - 12x + 8$.

- a. 1, -2 b. 1, -2, 2i c. 1, -2, ±2i d. 1, -2, -2i

12. Find the zeros (if any) of $f(x) = \frac{x^2 - 4}{x + 1}$.

- a. -1 b. ±2 c. ±2, -1 d. no zeros

13. Find the function with all the characteristics in the chart.

Characteristic	f(x)
X intercept	(1/2, 0)
Y intercept	none
Vertical Asymptote	X = 0
Horizontal Asymptote	Y = 2

- a. $f(x) = \frac{2x+1}{x}$ b. $f(x) = \frac{2x-1}{x}$ c. $f(x) = \frac{x+1}{2x}$ d. $f(x) = \frac{2x-1}{2x}$

14. Find the domain of $f(x) = \ln(x^2)$

- a. All reals b. all reals except 0 c. $x > e$ d. all reals greater than 0

15. Solve for x: $e^{2x} - 3e^x + 2 = 0$

- a. ln 2, 0 b. 0 c. 2, 0 d. no solution

16. Solve the equation $\log_b \sqrt{3} = \frac{1}{4}$

- a. ±9 b. $\frac{\sqrt{3}}{4}$ c. 9 d. 10

17. Given: $f(x) = e^{3 \ln x}$. Find the value of f(-2).

- a. -8 b. -2 c. 8 d. does not exist

18. Solve for q if $p^2q + r(-q - 1) = 4(p + r)$

- a. $q = \frac{4p+5r+rq}{p^2}$ b. $q = \frac{p^2q-5r-4p}{r}$ c. $q = \frac{4p+5r}{p^2-r}$ d. $q = \frac{4p+5r}{r-p^2}$

19. The Mu Alpha Theta club is having a contest. The winner will have a choice of two prizes.

Prize A starts with \$100 and adds \$50 per day for 15 days.

Prize B starts with 1 penny and doubles the money each day for 15 days after that day.

On the 15th day how much is each prize worth?

- a. Prize A: \$850, Prize B: \$327.68 c. Prize A: \$800, Prize B: \$163.84
 b. Prize A: \$900, Prize B: \$655.36 d. None of these

Name: _____

Tie Breaker #1

Find the equation of the tangent line to the circle defined by $(x - 2)^2 + (y - 1)^2 = 25$ at the point $(5, -3)$. Sketch the problem and show all work.

Tie Breaker #2

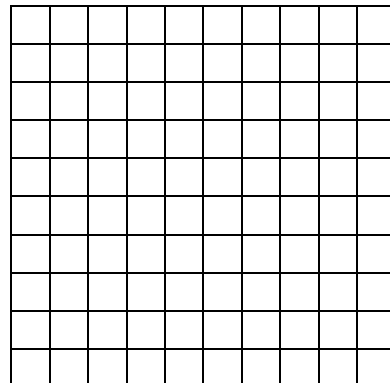
Solve the system. Show your work completely.

$$\begin{cases} x + y = -4 \\ x^2 + y = 2 \end{cases}$$

Tie Breaker #3

Use linear programming to find the maximum value of $z = 3x + 2y$ subject to the following constraints:

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ x + 2y \leq 4 \\ x - y \leq 1 \end{cases}$$



ANSWERS

1. B
2. D
3. B
4. A
5. D
6. C
7. B
8. C
9. C
10. A
11. C
12. B
13. B
14. B
15. A
16. C
17. D
18. C
19. A
20. B
21. B
22. C
23. B
24. C
25. B

#1. $y = \frac{3}{4}x - \frac{27}{4}$ or any other equivalent form. Some credit for the sketch.

#2. (3, -7) and (-2, -2)

#3. Maximum value of 8 at (2,1)

