

DEPARTMENT FINAL EXAMINATION—MATH 125

VERSION#1

TEST# _____

DO NOT WRITE ON THIS EXAMINATION—USE SCRATCH PAPER

1. Solve: $|x - 4| \leq 7$

a) $\{x | -3 \leq x \leq 11\}$

b) $\{x | -11 \leq x \leq 3\}$

c) $\{x | -11 \leq x \leq 11\}$

d) $\{x | x \leq 11\}$

2. A chemist mixed a 70% alcohol solution with a 30% alcohol solution to make a 45% alcohol solution. How many liters of each were used to make 120 L of a 45% alcohol solution?

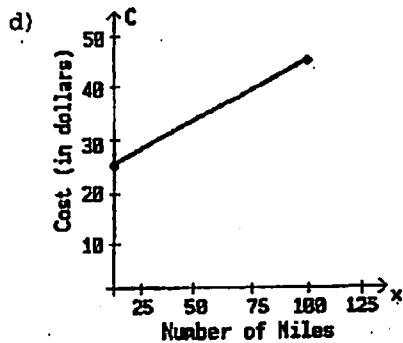
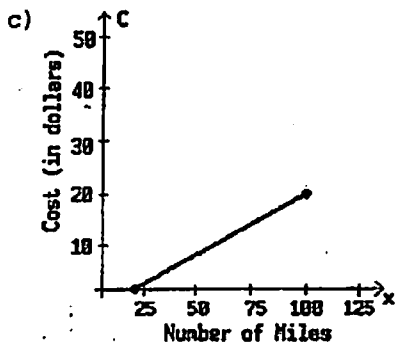
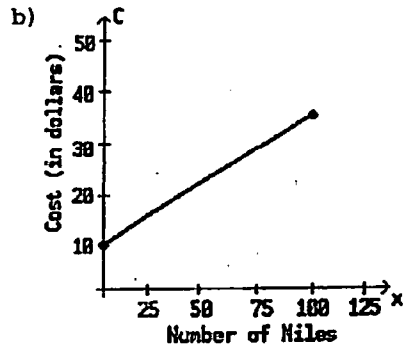
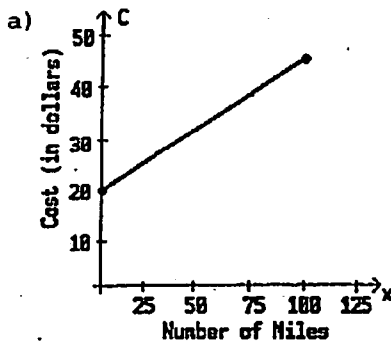
a) 75 L of 70%, 45 L of 30%

b) 18 L of 70%, 102 L of 30%

c) 45 L of 70%, 75 L of 30%

d) 22.5 L of 70%, 97.5 L of 30%

3. Boggs Trucking Company rents trucks for \$20 a day plus \$.25 per mile. The equation that describes the cost of renting a truck is given by $C = 0.25x + 20$, where x is the number of miles driven. Graph this equation for $0 \leq x \leq 100$.



4. Find the equation of the line containing $P_1(1, 3)$ and $P_2(2, 4)$.

a) $y = -x + 4$ b) $y = \frac{7}{3}x + \frac{16}{3}$
 c) $y = x + 2$ d) $y = x - 4$

5. Find the equation of the line containing the point $(-1, 5)$ and perpendicular to the line $3x + y = -2$.

a) $y = -3x + 2$ b) $y = 3x + 8$
 c) $y = \frac{1}{3}x + \frac{16}{3}$ d) $y = -\frac{1}{3}x + \frac{14}{3}$

6. Solve by the addition method:

$$\begin{aligned} 2x - y - 3z &= -4 \\ x + y + z &= 0 \\ x - y + 4z &= -9 \end{aligned}$$

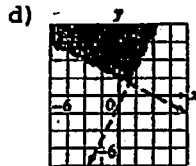
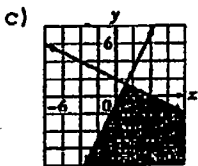
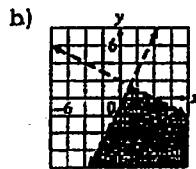
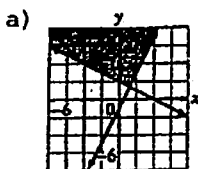
a) $(-2, -3, 5)$ b) $(-2, -15, 5)$
 c) inconsistent d) $(-2, 3, -1)$

7. Evaluate the determinant:

$$\begin{vmatrix} 1 & 4 & 2 \\ 2 & 3 & 1 \\ 6 & 2 & 4 \end{vmatrix}$$

a) 22 b) 34 c) -26 d) 114

8. Graph the solution set: $2x - y > 1$
 $x + 2y < 4$



9. Given $R(x) = -x^5 + 4x^2 - 9x - 7$, evaluate $R(0)$.
- a) -13 b) 7 c) -7 d) -19
10. Rewrite $\sqrt[5]{a^4}$ as an exponential expression.
- a) a^{20} b) a^9 c) $a^{4/5}$ d) $a^{5/4}$
11. Divide: $\frac{8}{3+i}$
- a) $\frac{12}{5} - \frac{4}{5}i$ b) $\frac{12}{5} - \frac{1}{5}i$
c) $\frac{4}{3} - \frac{1}{9}i$ d) $\frac{4}{3} - \frac{4}{9}i$
12. Solve: $\sqrt{x-17} + \sqrt{x} = 17$
- a) 9 b) 17
c) no solution d) 81
13. One printer can print the paychecks for the employees of a company in 60 min. A second printer can print the checks in 90 min. How long would it take to print the checks with both printers operating?
- a) 20 min b) 12 min c) 42 min d) 36 min
14. The frequency of vibration (f) in an open organ pipe varies inversely as the length (L) of the pipe. If the air in a pipe 3 m long vibrates 90 times per min, find the frequency in a pipe that is 2 m long.
- a) 60 vibrations per min
b) 540 vibrations per min
c) 135 vibrations per min
d) 120 vibrations per min
15. Solve $A = \frac{1}{2}h(b_1 + b_2)$ for b_1 .
- a) $b_1 = \frac{2A - b_2h}{h}$ b) $b_1 = \frac{2A - b_2}{h}$
c) $b_1 = \frac{2b_2 - A}{h}$ d) $b_1 = 2Ah - b_2$

16. Solve by using the quadratic formula: $2x^2 + 2x + 5 = 0$

a) $\frac{-2 + i\sqrt{38}}{4}, \frac{-2 - i\sqrt{38}}{4}$

b) $\frac{-1 + 3i}{2}, \frac{-1 - 3i}{2}$

c) $-1 + 3i, -1 - 3i$

d) $\frac{-1 + \sqrt{11}}{2}, \frac{-1 - \sqrt{11}}{2}$

17. Solve: $x^4 + x^2 - 12 = 0$

a) $2i, -2i, \sqrt{3}, -\sqrt{3}$

b) $2, \sqrt{3}$

c) $2, -2, i\sqrt{3}, -i\sqrt{3}$

d) $4, 3$

18. A boat traveled 60 mi down a river and then returned. The total time for the trip was 5 h, and the rate of the current was 5 mph. Find the rate of the boat in still water.

a) 25 mph

b) 12 mph

c) 18 mph

d) 15 mph

19. Solve: $x^2 - 5x + 6 \geq 0$

Write the solution set in set-builder notation.

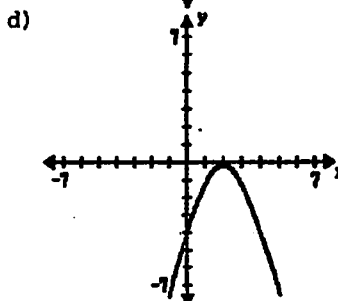
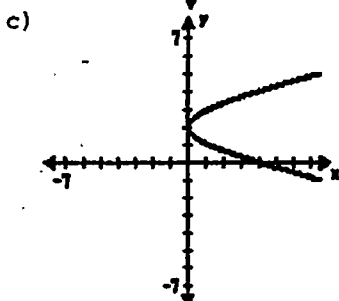
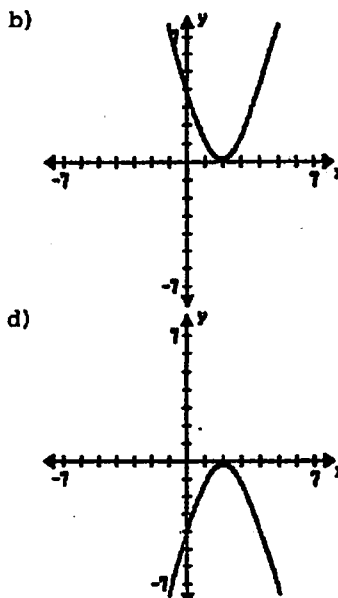
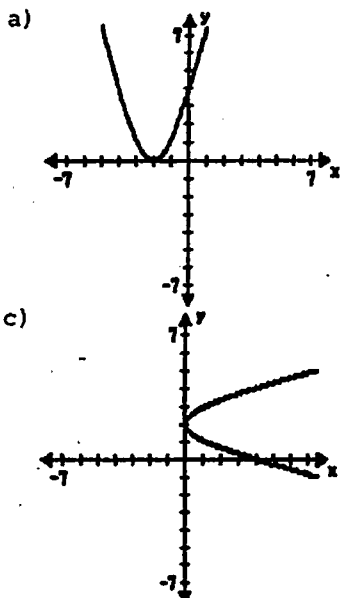
a) $\{x|x \leq 2 \text{ or } x \geq 3\}$

b) $\{x|x \leq -3\}$

c) $\{x|2 \leq x \leq 3\}$

d) $\{x|x \leq -2 \text{ or } x \geq -3\}$

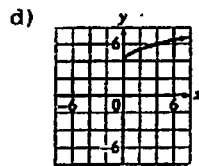
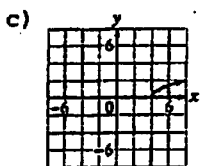
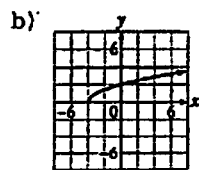
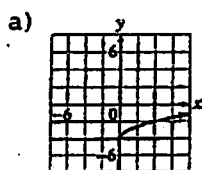
20. Graph: $y = x^2 - 4x + 4$



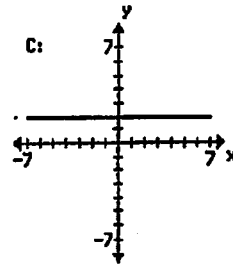
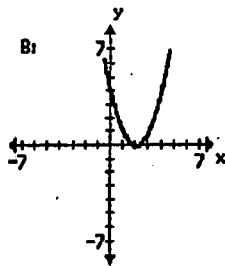
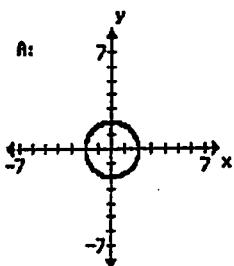
21. The height in feet (s) of a rock thrown straight up is given by the function $s(t) = -16t^2 + 96t$, where t is the time in seconds. Find the maximum height above the ground that the rock will attain.

- a) 3 ft b) 144 ft
c) 1152 ft d) 432 ft

22. Graph: $f(x) = \sqrt{x + 4}$



23. Which graph(s) do not represent a function?

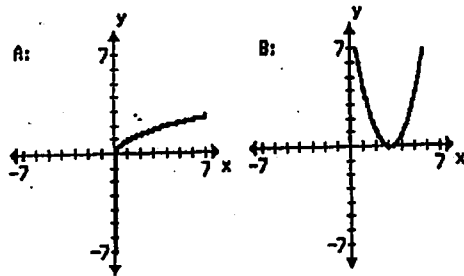


- a) none b) B and C
c) A only d) B only

24. If $f(x) = x^2 - 6$ and $g(x) = x + 8$, find $f[g(x)]$.

- a) $x^2 + 16x + 58$ b) $x^2 + 58$
c) $x^2 + 8x + 10$ d) $x^2 + 2$

25. Which graph(s) represent a 1-to-1 function?

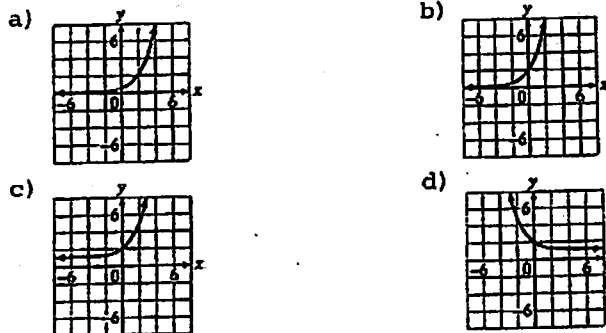


- a) A and B b) none c) B only d) A only

26. Find the inverse of $f(x) = 4x + 11$.

- a) $f^{-1}(x) = \frac{1}{4}x - 11$ b) $f^{-1}(x) = \frac{1}{4}x - \frac{11}{4}$
 c) $f^{-1}(x) = \frac{1}{4}x + \frac{4}{11}$ d) $f^{-1}(x) = \frac{1}{4}x + 11$

27. Graph: $f(x) = 2^x + 1$



28. Write $\log_b c = y$ in exponential form.

- a) $b^c = y$ b) $c^y = b$
 c) $b^y = c$ d) $c^b = y$

33. Solve for x : $\log_5 x + \log_5 (2x - 1) = \log_5 1$

- a) no solution b) $\frac{1}{2}$
 c) 1 d) $-\frac{1}{2}, 1$

34. The equation $A = A_0(1/2)^{t/k}$ is the exponential decay

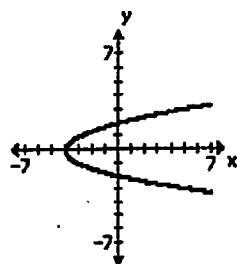
equation. A is the amount of radioactive material present after time t , k is the half-life, and A_0 is the original amount of radioactive substance. A sample of the radioactive element einsteinium contained 2 mg. Four hundred fifteen days later the sample contained 0.7 mg. What is the half-life of einsteinium in days? Round to the nearest whole number.

- a) 1613 days b) 274 days c) 297 days d) 629 days

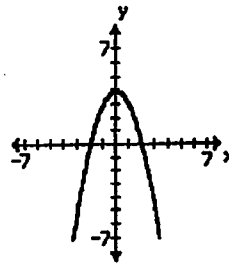
35. Graph the parabola given by the equation:

$$x = -y^2 + 4$$

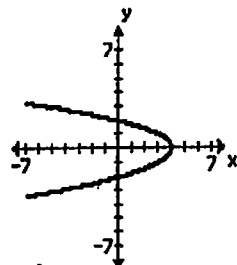
a)



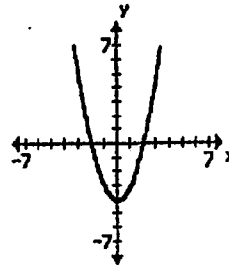
b)



c)



d)



36. Find the equation of the circle with radius 2 and center $(-2, -1)$.

- a) $(x + 2)^2 + (y + 1)^2 = 2$ b) $(x + 2)^2 + (y + 1)^2 = 4$
 c) $(x - 2)^2 + (y - 1)^2 = 2$ d) $(x - 2)^2 + (y - 1)^2 = 4$

29. Write $\log_6 x^3 y z^2$ in expanded form.

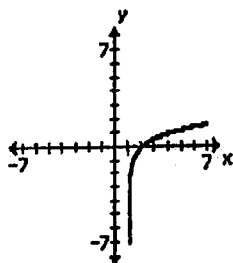
- a) $6 \log_6 (x + y + z)$
- b) $\log_6 (x^3 + y + z^2)$
- c) $(\log_6 x^3)(\log_6 y)(\log_6 z^2)$
- d) $3 \log_6 x + \log_6 y + 2 \log_6 z$

30. Express $\frac{1}{2} (5 \log_5 x - 3 \log_5 y + \log_5 z)$ as a single logarithm with a coefficient of 1.

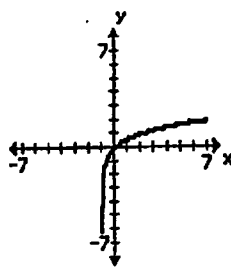
- a) $\log_5 \sqrt{\frac{x^5 z}{y^3}}$
- b) $\sqrt{\log_5 \frac{x^5 z}{y^3}}$
- c) $\log_5 (x^{5/2} - y^{3/5} + z^5)$
- d) $\log_5 \sqrt{\frac{x^5}{y^3 z}}$

31. Graph: $f(x) = \log_3 (x - 1)$

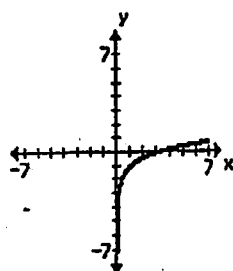
a)



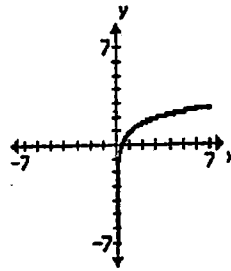
b)



c)



d)

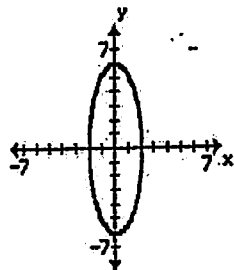


32. Solve for x: $3^{2x+1} = 15$

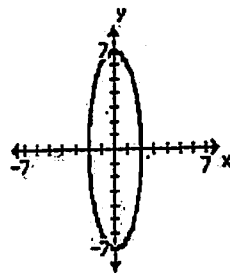
- a) -0.1505
- b) 1.7325
- c) -0.3040
- d) 0.7325

37. Sketch the graph: $\frac{x^2}{4} + \frac{y^2}{36} = 1$

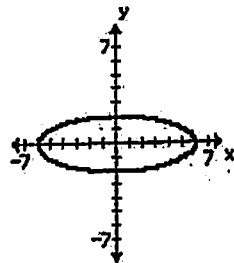
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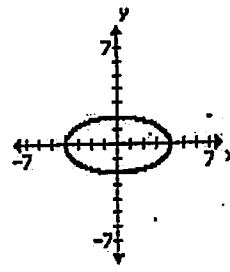
b)



c)



d)



38. Solve: $x^2 + 4y^2 = 25$
 $x^2 - y^2 = 5$

a) $(-3, 2)$ and $(3, 2)$

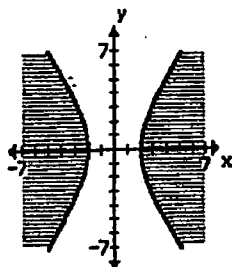
b) $(2, 3)$, $(2, -3)$, $(-2, 3)$, and $(-2, -3)$

c) $(3, 2)$ and $(3, -2)$

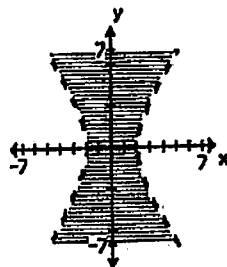
d) $(3, 2)$, $(-3, 2)$, $(3, -2)$, and $(-3, -2)$

39. Graph the solution set of $\frac{y^2}{4} - \frac{x^2}{9} < 1$.

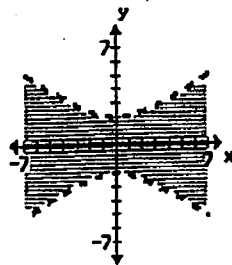
a)



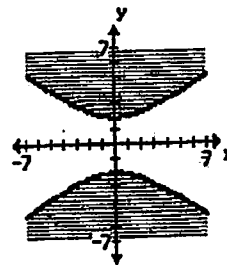
b)



c)



d)



40. Write the first 3 terms of the expansion of $(2x - y)^6$.

- a) $64x^6 + 32x^5y + 16x^4y^2$
- b) $64x^6 - 32x^5y + 16x^4y^2$
- c) $64x^6 - 192x^5y + 240x^4y^2$
- d) $64x^6 + 192x^5y + 240x^4y^2$