DEPARTMENT FINAL EXAMINATION MATH 125
5/07 VERSION 1 TEST
DO NOT WRITE ON EXAM

1. A solution of 57% vinegar is to be mixed with a solution of 22% vinegar to form 70 liters of a 42% solution. How many liters of the 57% solution must be used?

   [A] 52 [B] 37 [C] 40 [D] 50

2. Solve. $|x+3|>2$

   [A] $\{x|-5<x<-1\}$ [B] $\{x|x\le -5 \text{ or } x\ge -1\}$

   [C] $\{x|x<-5 \text{ or } x>-1\}$ [D] $\{x|-5\le x\le -1\}$

3. Determine the equation of the line, in slope-intercept form, that contains the points. (7, 2) and (1, −7)

   [A] $y=-\frac{2}{3}x+\frac{17}{2}$ [B] $y=-\frac{2}{3}x+\frac{2}{17}$ [C] $y=\frac{3}{2}x-\frac{17}{2}$ [D] $y=-\frac{3}{2}x-\frac{2}{17}$

4. Find the equation of the line, in slope-intercept form, that is perpendicular to $-7x-4y=4$ and contains $(-6, 5)$.

   [A] $y=\frac{4}{7}x+\frac{59}{7}$ [B] $y=\frac{4}{7}x+\frac{11}{7}$ [C] $y=-\frac{4}{7}x+\frac{11}{7}$ [D] $y=\frac{7}{4}x+\frac{31}{2}$

5. If the (x,y,z) is the solution to the linear system:
$$\begin{aligned} 2x+2y+3z&=13\\ -3x+4y-z&=5\\ 5x-3y+z&=2\end{aligned}$$
   then $x+y+z=?$

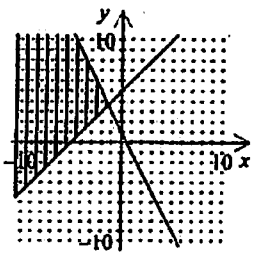
[A] $x+y+z=-7$ [B] $x+y+z=6$ [C] $x+y+z=-14$ [D] none of these

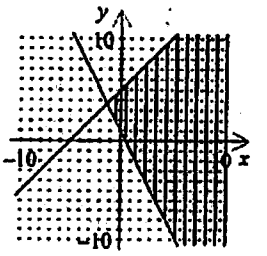
6. Evaluate the determinant: $\begin{vmatrix} 1 & -1 & 2\\ 3 & 2 & 1\\ 1 & 0 & 4\end{vmatrix}$

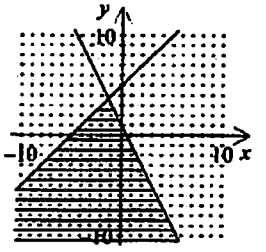
[A] 12 [B] 0 [C] 15 [D] -8

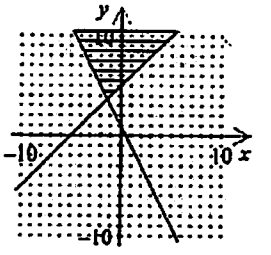
7. Graph the solution set. $y \le x+5$

$y \ge -2x+1$

[A] 

[B] 

[C] 

[D] 

8. Simplify. $(-2x^3-2x-4) \div (x-3)$

[A] $-2x^2-8x+24+\frac{68}{x-3}$

[B] $-2x^2-6x-20-\frac{64}{x-3}$

[C] $-2x^2-6x+16+\frac{42}{x-3}$

[D] $-2x^2-8x-28-\frac{84}{x-3}$

9. Divide by using synthetic division. $\frac{x^4-1}{x-1}$

[A] x^3+x^2+x+1

[B] x^3-x^2+x-1

[C] $x^4+x^3+x^2+x+1$

[D] x^3+x^2+x-1

10. Find the x-intercepts of $y = f(x) = 6x^2 + 7x + 2$

[A] $(\frac{-2}{3},0)$ and $(\frac{1}{2},0)$

[B] $(\frac{2}{3},0)$ and $(\frac{1}{2},0)$

[C] $(\frac{-2}{3},0)$ and $(\frac{-1}{2},0)$

[D] (2,0) and (-3,0)

11. Determine the domain of the function. $f(x)=\dfrac{x^2-x-2}{x^2+x-30}$

[A] $\{x|x\neq -6 \text{ and } x\neq 5\}$ [B] $\{x|x\neq 6 \text{ and } x\neq -5\}$

[C] $\{x|x\neq -2 \text{ and } x\neq 1\}$ [D] $\{x|x\neq 2 \text{ and } x\neq -1\}$

Simplify.

12. $\dfrac{x+3}{x-3}\div\dfrac{x^2-9}{3-x}$ [A] $\dfrac{1}{5-x}$ [B] $\dfrac{1}{x-3}$ [C] $\dfrac{x+3}{x-3}$ [D] $\dfrac{1}{3-x}$

13. $\dfrac{9}{x^2-4x+3}-\dfrac{2}{x-3}$

[A] $\dfrac{7}{x^2-5x+6}$ [B] $\dfrac{-2x+7}{x^2-4x+3}$ [C] $\dfrac{-2x+8}{x^2-4x+3}$ [D] $\dfrac{-2x+11}{x^2-4x+3}$

14. Solve. $1-\dfrac{9}{x-3}=-\dfrac{54}{x^2-9}$

[A] -6 or 3 [B] 3 or 6 [C] 6 [D] no solution

15. Rewrite the radical expression as an exponential expression.
$\sqrt[4]{2x^3}$

[A] $2x^{4/3}$ [B] $(2x^3)^{1/4}$ [C] $\dfrac{1}{2x^{4/3}}$ [D] $\dfrac{1}{2x^{3/4}}$

16. Simplify. $\sqrt[3]{f^{15}}$ [A] f^{12} [B] f^{45} [C] f^3 [D] f^5

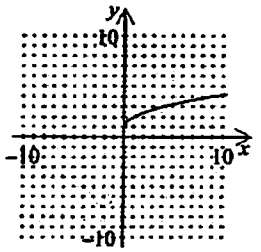
17. Determine the domain of the function $f(x)=\sqrt{x+1}+6$.

[A] domain $\{x|x\geq 0\}$ [B] domain $\{x|x\geq 1\}$

[C] domain $\{x|x\geq -1\}$ [D] domain $\{x|x\leq 0\}$

18. Graph: $f(x)=\sqrt{x+1}$

[A]



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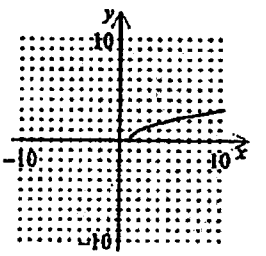

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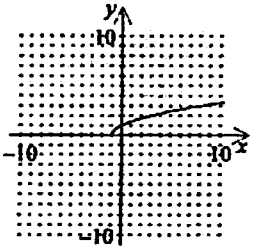

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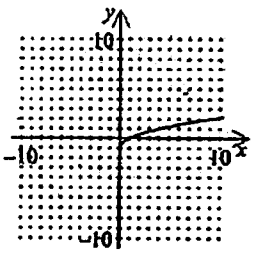


19. Solve. $\sqrt{x+34}=x+14$ [A] -9 [B] -18 [C] $-18,\ -9$ [D] no solution

20. Simplify. $\dfrac{2+i}{3-i}$

[A] $\frac{1}{2}+\frac{1}{2}i$ [B] $\frac{7}{8}+\frac{1}{8}i$ [C] $\frac{2}{3}+\frac{1}{3}i$ [D] $\frac{2}{3}-\frac{1}{3}i$

21. Solve using the quadratic formula. $x^2-2x+17=0$

[A] $-1+8i,\ -1-8i$ [B] $1+8i,\ 1-8i$ [C] $-1+4i,\ -1-4i$ [D] $1+4i,\ 1-4i$

22. Solve. $x^4-12x^2+11=0$

[A] $1,\ \sqrt{11}$ [B] $\pm1,\ \pm\sqrt{11}$ [C] $\pm1,\ \pm11$ [D] $1,\ 11$

23. When a rocket is shot into the air, its height h, in feet above the ground, is a function of time t, in seconds. The height of the rocket can be found using the formula $h(t) = 144t - 16t^2$.

a. Which is the rocket's height after 5 seconds?
b. After how many seconds will the rocket be at a height of 288 feet?

[A] a. 695 ft
b. 3

[B] a. 720 ft
b. 2 and 7

[C] a. 640 ft
b. 9

[D] a. 320 ft
b. 3 and 6

24. Solve. $x^2 + 2x \geq 8$

[A] $\{x | -2 \leq x \leq 4\}$

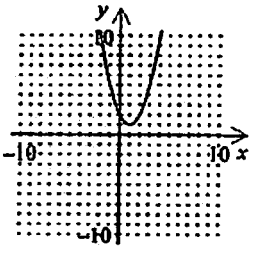
[B] $\{x | x \leq -4 \text{ or } x \geq 2\}$

[C] $\{x | -4 \leq x \leq 2\}$

[D] $\{x | x \leq -2 \text{ or } x \geq 4\}$

25. Find the graph of the equation. $f(x) = x^2 - 2x + 2$

[A]



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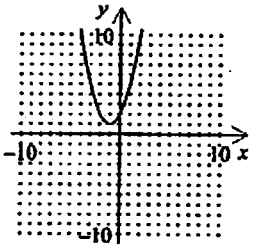

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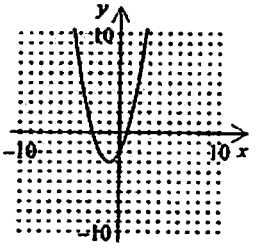

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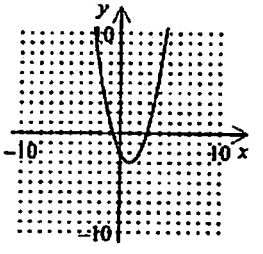


26. If the revenue is given by $R = 120x - 0.04x^2$, find the value of x that yields the maximum revenue.

[A] 9000

[B] 1500

[C] 750

[D] 2000

27. Solve $5 + 2^x = 25$ and round your answer to the nearest hundredth.

[A] x = 4.32 [B] x = 2.73 [C] x = 4 [D] x = 2.32

28. For the pair of functions, find $(g \circ f)(x)$.

$f(x) = x + 3,\ g(x) = \sqrt{x+1};\ x \geq -1$

[A] $\sqrt{x+1} + 3$ [B] $\sqrt{x+3} - 1$ [C] $\sqrt{x+4}$ [D] $\sqrt{x+1}$

29. For the function y = f(x) = 2x + 4, find the inverse function $f^{-1}(x)$.

[A] $f^{-1}(x) = \frac{1}{2}x + 2$

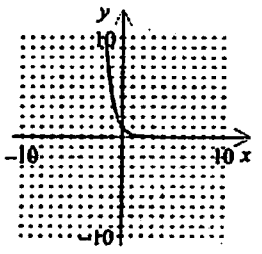
[B] $f^{-1}(x) = x - 2$

[C] $f^{-1}(x) = \frac{1}{2}x - 2$

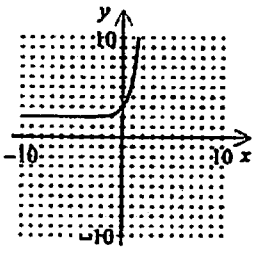
[D] $f^{-1}(x) = 4x + 2$

30. Identify the graph of the function. $f(x) = 4^x + 2$

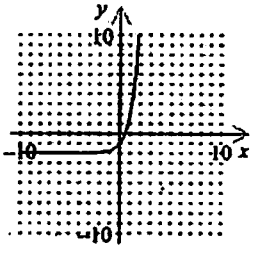
[A]



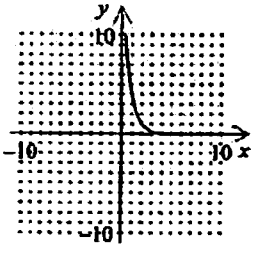
[B]



[C]



[D]



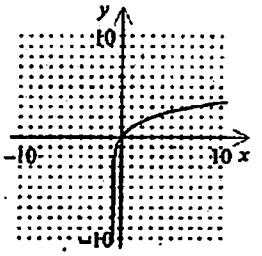
31. Which is the logarithm written as a single expression?

$2\log_b x - 4\log_b y$

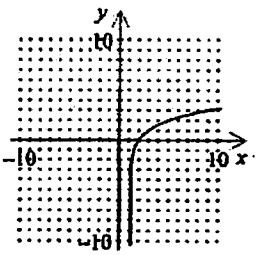
[A] $\log_b\left(\frac{x^2}{y^4}\right)$ [B] $\log_b(2x4y)$ [C] $\log_b\left(\frac{y^4}{x^2}\right)$ [D] $\log_b(x^2y^4)$

32. Identify the graph of the logarithmic function. $f(x) = \log_2(x+1)$

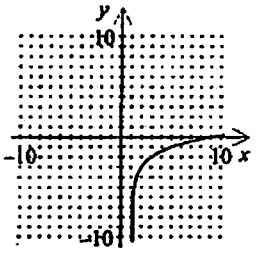
[A]



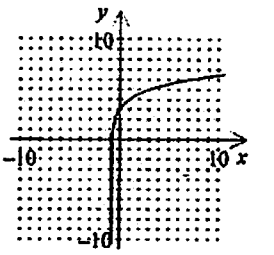
[B]



[C]



[D]



33. The current (I) in a wire varies directly as the voltage (v) and inversely as the resistance (r). If the current is 32 amps when the voltage is 192 volts and the resistance is 6 ohms, find the current when the voltage is 210 volts and the resistance is 12 ohms.

[A] 2520 amps [B] 17.5 amps

[C] 35 amps [D] 1260 amps

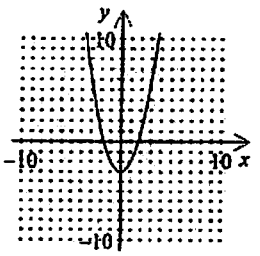
34. $\log_7(x+2) - \log_7(x-4) = \log_7 7$ [A] $\frac{1}{3}$ [B] 5 [C] −3 [D] 1

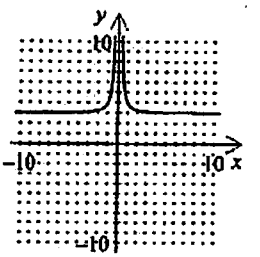
35. The number of bacteria present in a culture after t minutes is given by $B(t) = 10e^{kt}$. If there were 6073 bacteria present after 10 minutes, find k. Round your answer to the nearest thousandth.

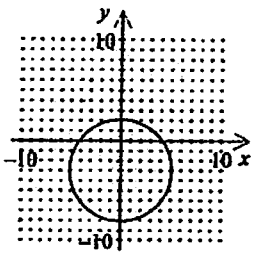
[A] $k \approx 64.091$ [B] $k \approx 0.692$

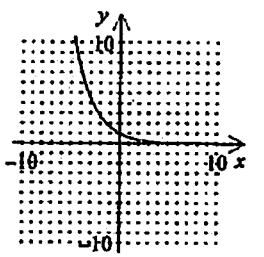
[C] $k \approx 0.641$ [D] $k \approx 6.409$

36. Which of the following are one-to-one functions?

i. 

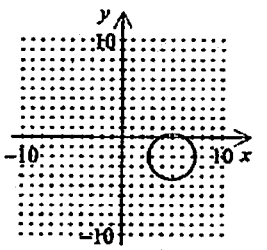
ii. 

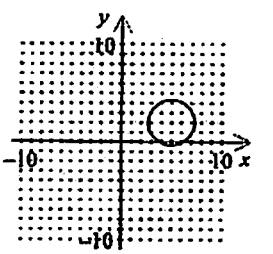
iii. 

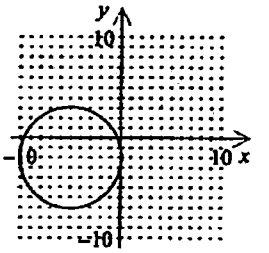
iv. 

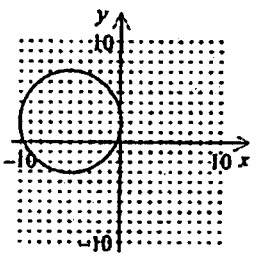
[A] i, ii and iv only [B] ii and iv only [C] iv only [D] i and iv only

37. Identify the graph of the circle given by the equation $(x+5)^2+(y-2)^2=25$.

[A] 

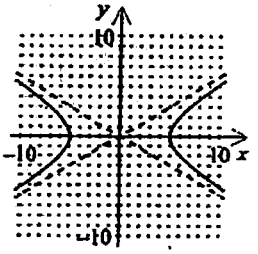
[B] 

[C] 

[D] 

38. Identify the graph of the hyperbola given by the equation. $25x^2 - 9y^2 = 225$

[A]



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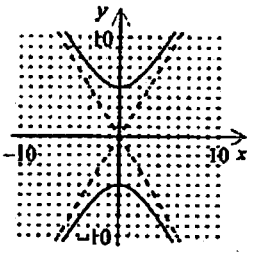

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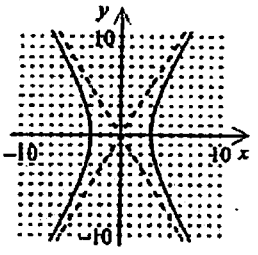
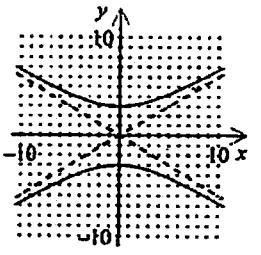


[D]



39. Solve the system. $x^2 + y^2 = 10$
$x^2 - y^2 = 8$

[A] $(-3, -1), (3, 1)$

[B] $(-3, -1), (3, -1), (-3, 1), (3, 1)$

[C] $(-2, -4), (-2, 4), (2, -4), (2, 4)$

[D] no real solution

40. Write in expanded form.
$(3a - b)^4$

[A] $81a^4 + 108a^3b + 54a^2b^2 + 12ab^3 + b^4$

[B] $81a^4 - 12a^3b + 18a^2b^2 - 12ab^3 + b^4$

[C] $81a^4 - 108a^3b + 54a^2b^2 - 12ab^3 + b^4$

[D] $81a^4 + 12a^3b + 18a^2b^2 + 12ab^3 + b^4$