

EARLY EXAM
MAT 125 and 131
September 19, 2002, 8:30-10 p.m.

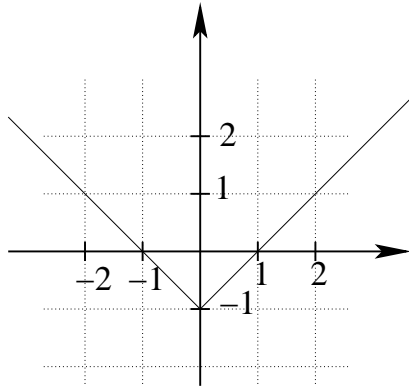
Please answer each question on your opscan. **No calculators are to be used on this exam.**

1. Which of the following straight lines is parallel to the line $2y = 4x - 3$?
 - (a) $2x = 4y + 7$
 - (b) $4x = -2y + 3$
 - (c) $2y + 4x = -3$
 - (d) $y = 2x + 2$
 - (e) none of these

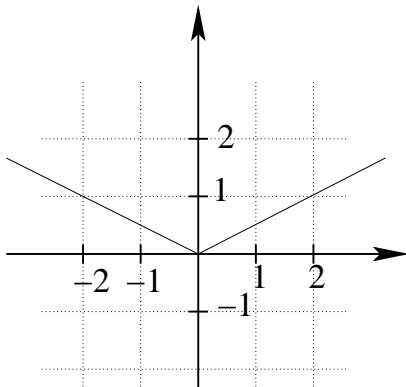
2. Which of the following is the equation of the straight line passing through the points $(-1, 0)$ and $(1, 1)$?
 - (a) $y = \frac{x + 1}{2}$
 - (b) $y = \frac{x - 1}{2}$
 - (c) $y = \frac{x}{2} + 1$
 - (d) $y + x = 1$
 - (e) none of these

3. $\frac{3^{3x}}{9^{(-x/4)}} =$
 - (a) $3^{10x/3}$
 - (b) $3^{7x/2}$
 - (c) $3^{5x/2}$
 - (d) $\left(\frac{1}{3}\right)^{3x}$
 - (e) none of these

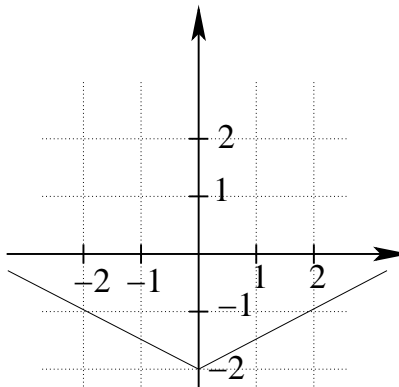
4. The following is a graph of a function $f(x)$.



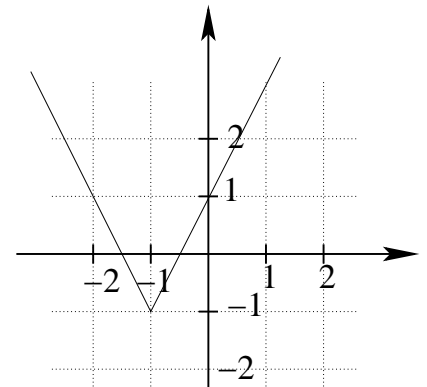
Which of the following graphs is the graph of $f(2x) + 1$?



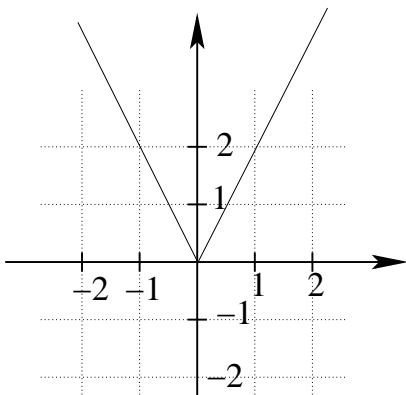
(a)



(b)



(c)



(d)

(e) none of these

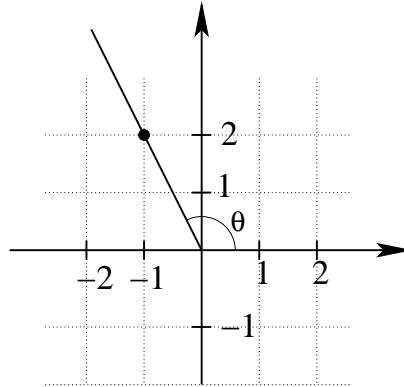
5. If $x = \log_2 3$, then $8^{x/2} =$

- (a) 3^3
- (b) $3\sqrt{3}$
- (c) 2^3
- (d) $2^{3.5}$
- (e) none of these

6. Let $p(x) = (x + 7)^2 + 3$. Then $p(x)$ is smallest when $x =$
- (a) 0
 - (b) 7
 - (c) -7
 - (d) -3
 - (e) none of these

7. Let θ denote the angle in the following picture. What is $\sin(\theta)$?

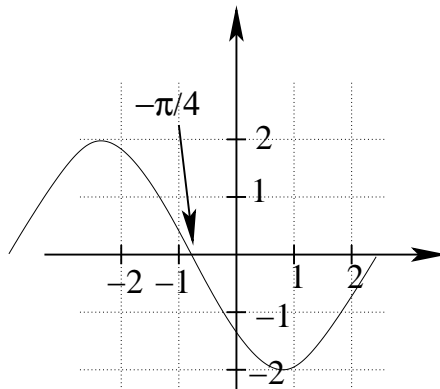
- (a) $\frac{-1}{2}$
- (b) -2
- (c) $\frac{2}{\sqrt{5}}$
- (d) $\frac{2}{5}$
- (e) none of these



8. Which of the following is the set of all solutions of the inequality $x^2 + 2x - 3 \leq 0$?
- (a) $[-3, 1]$
 - (b) $[-3, 3]$
 - (c) $(-\infty, -3] \cup [1, \infty)$
 - (d) $[1, \infty)$
 - (e) none of these

9. The following is the graph of the function $A \sin(x + b)$ (x is measured in radians). What are A, b ?

- (a) $A = 1/2, b = -\pi/4$
- (b) $A = -2, b = \pi/4$
- (c) $A = 2, b = -\pi/4$
- (d) $A = 2, b = \pi/4$
- (e) none of these



10. Which of the following is the set of **all** solutions of the equations $\log_3 x + \log_3(x - 1) = 0$
- (a) Two solutions: $x = 0, x = 1$
 - (b) One solution: $x = 1$
 - (c) One solution: $x = (1 + \sqrt{5})/2$

- (d) Two solutions: $x = (1 + \sqrt{5})/2, x = (1 - \sqrt{5})/2$
 (e) No solutions
11. Which of the following is the set of **all** solutions of inequality $2^{-x} < 4$?
 (a) $x < -2$
 (b) $x > -2$
 (c) $0 < x < -2$
 (d) $x > 2$
 (e) none of the above
12. Let $f(x) = \sqrt{x}$, and let $g(x) = x^2 + 1$. What is $f(g(-1))$?
 (a) 0
 (b) $\sqrt{2}$
 (c) 1
 (d) -1
 (e) undefined
13. The function $h(x) = \frac{(x+1)^2 + 1}{x}$ can be written as the following composition:
 (a) $h(x) = f(g(x)), f(x) = x + 1, g(x) = \frac{(x+1)^2}{x}$
 (b) $h(x) = f(g(x)), f(x) = \frac{(x+1)^2}{x}, g(x) = x + 1$
 (c) $h(x) = f(g(x)), f(x) = x + 1, g(x) = \frac{x^2+1}{x-1}$
 (d) $h(x) = f(g(x)), f(x) = \frac{x^2+1}{x-1}, g(x) = x + 1$
 (e) none of these

The next 3 questions are True/False questions. Pick (a) if the statement is true. Pick (b) if the statement is false.

14. For all x , one has $\frac{\cos(2x)}{\cos(x)} = 2$
 (a) true
 (b) false
15. If $p(x) = ax^2 + bx + c$, where $a \neq 0$, then p cannot be an increasing function on the whole real line.
 (a) true
 (b) false
16. If $x > 0$, then $\ln x > 0$.
 (a) true
 (b) false