

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

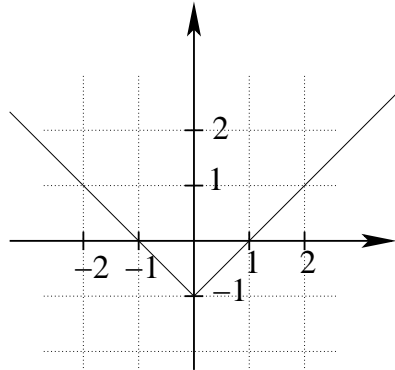
2. Which of the following is the equation of the straight line passing through the points  $(-1, 0)$  and  $(1, 1)$ ?

- (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

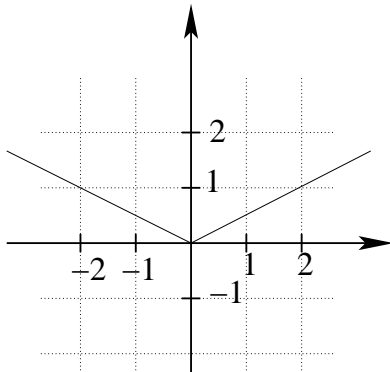
3.  $\frac{3^{3x}}{9^{(-x/4)}} =$

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

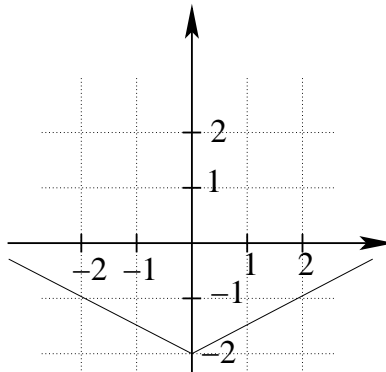
4. The following is a graph of a function  $f(x)$ .



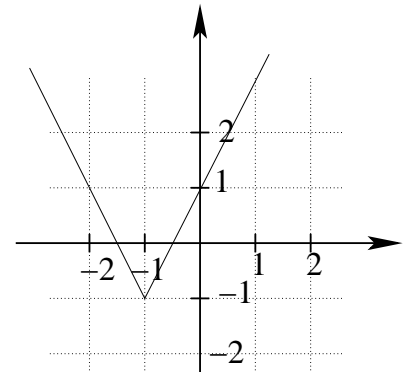
Which of the following graphs is the graph of  $f(2x) + 1$ ?



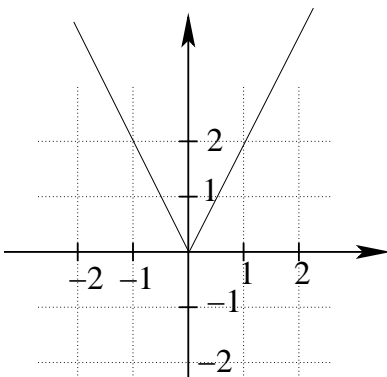
(a)



(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)  $2^3$

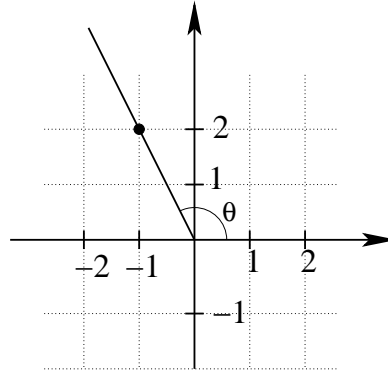
(d)  $2^{3.5}$

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

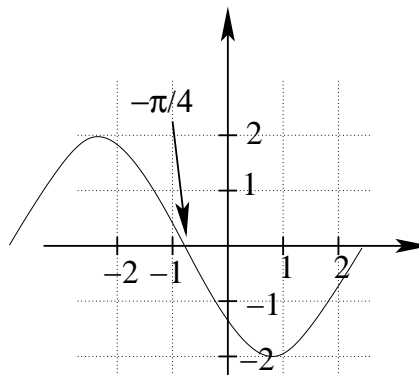
- (a)  $\frac{-1}{2}$
- (b)  $-2$
- (c)  $\frac{2}{\sqrt{5}}$
- (d)  $\frac{2}{5}$
- (e) none of these



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)  $h(x) = f(g(x)), \quad f(x) = x + 1, \quad g(x) = \frac{(x+1)^2}{x}$
- (b)  $h(x) = f(g(x)), \quad f(x) = \frac{(x+1)^2}{x}, \quad g(x) = x + 1$
- (c)  $h(x) = f(g(x)), \quad f(x) = x + 1, \quad g(x) = \frac{x^2+1}{x-1}$
- (d)  $h(x) = f(g(x)), \quad f(x) = \frac{x^2+1}{x-1}, \quad g(x) = x + 1$
- (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