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) $y = \frac{x + 1}{x - 1}$
   (b) $y = \frac{2}{x}$
   (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) $(\frac{1}{3})^{3x}$
   (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