This is a one hour multiple choice test. There are 30 questions, and you must have a minimum of 20 correct answers to receive credit for this exam. There is no penalty for wrong answers.

1. \( \cos 30^\circ \sin 45^\circ - \tan 60^\circ \sin 90^\circ = \)
   (a) \( \frac{1 - \sqrt{3}}{2} \)  
   (b) \( \frac{\sqrt{2}}{4} - \sqrt{3} \)  
   (c) \( \frac{\sqrt{2}}{4} - \sqrt{3} \)
   (d) \( \frac{\sqrt{2} - 2\sqrt{3}}{4} \)  
   (e) \( \frac{\sqrt{2}}{4} \) - \( \frac{1}{\sqrt{3}} \)

2. If \( \tan \theta = -\frac{3}{4} \) and \( \theta \) is in Quadrant IV, then \( \sin \theta = \)
   (a) - \( \frac{4}{5} \)  
   (b) - \( \frac{3}{5} \)  
   (c) \( \frac{3}{5} \)  
   (d) \( \frac{4}{5} \)  
   (e) - \( \frac{3}{4} \)

3. \( \sin(\cos^{-1}(-\frac{4}{5})) \)
   (a) - \( \frac{4}{5} \)  
   (b) - \( \frac{3}{5} \)  
   (c) \( \frac{3}{5} \)  
   (d) \( \frac{4}{5} \)  
   (e) \( \frac{5}{3} \)

4. \( \frac{1}{2} \sin(4\theta) \)
   (a) \( \sin(2\theta)\cos(2\theta) \)  
   (b) \( 2\sin \theta \)  
   (c) \( \pm \frac{\sqrt{1 - \cos(2\theta)}}{2} \)  
   (d) \( 2\sin \theta \cos \theta \)  
   (e) \( \sin(2\theta) \)

5. A circle with center \((-1, 3)\) contains the point \((3, 5)\). The radius of this circle is
   (a) - \( 2\sqrt{5} \)  
   (b) \( 2\sqrt{5} \)  
   (c) 20  
   (d) \( 2\sqrt{2} \)  
   (e) \( 4\sqrt{5} \)

6. The equation of the line passing through the point \((4, -3)\) and having slope \(-2\) is
   (a) \( 2x + y = -5 \)  
   (b) \( 2x + y = 5 \) (c) \( x + 2y = -2 \)  
   (d) \( x + 2y = 10 \)  
   (e) \( 2x - y = -5 \)

7. If \( f(x) = \frac{x + 3}{x - 2} \) and \( g(x) = x^3 - 2 \), then \( f(g(-1)) = \)
   (a) -3  
   (b) -1  
   (c) 0  
   (d) 1  
   (e) 3

8. The slope of a straight line perpendicular to the straight line which passes through the points \((1, 2)\) and \((3, -2)\) is
   (a) \( -2 \)  
   (b) \( -\frac{1}{2} \)  
   (c) 0  
   (d) \( \frac{1}{2} \)  
   (e) 2

9. Let \( f(x) = \frac{x^2 + 1}{(x + 2)(x - 3)} \). How many vertical asymptotes does the graph of \( f \) have
   (a) 0  
   (b) 1  
   (c) 2  
   (d) 3  
   (e) 6

10. If \( f(x) = x^2 + 4 \) and \( g(x) = \sqrt{x} \), then \( g(f(x)) = \)
    (a) \( \sqrt{x^2 + 4} \)  
    (b) \( x + 4 \)  
    (c) \( \sqrt{x + 2} \)  
    (d) \( x + 2 \)  
    (e) \( |x + 2| \)
11. A function \( f \) is defined by \( f(x) = x - 2 \). Which one of the following points is on the graph of the inverse \( f^{-1} \)?

(a) (-3, -1)  
(b) (-1, 3)  
(c) (1, -3)  
(d) (1, -1)  
(e) (3, 1)

12. The graph of the parabola \( x = -y^2 + 2y - 3 \)

(a) opens upward  
(b) opens downward  
(c) opens to the right  
(d) opens to the left  
(e) has one of the coordinate axis as its line of symmetry

13. Which one of the following is true for the graph of \( y = e^x \)?

(a) It crosses the x-axis exactly once.  
(b) It is asymptotic to the negative y-axis.  
(c) It rises as \( x \) decreases.  
(d) It intersects the y-axis at \((0, e)\).  
(e) It crosses every line \( y = c \) exactly once where \( c \) is any positive constant.

14. Which one of the following polynomial is not a factor of \( x^4 + x^3 - x - 17 \)?

(a) \( x^2 + x + 1 \)  
(b) \( x^2 + 1 \)  
(c) \( x^2 - 1 \)  
(d) \( x + 1 \)  
(e) \( x - 1 \)

15. Let \( f(x) = \sqrt{3 - x} + \log_{10} x \). The domain of \( f \) consists of all real numbers \( x \) such that

(a) \( x \leq 3 \)  
(b) \( 0 \leq x \leq 3 \)  
(c) \( 0 < x \leq 3 \)  
(d) \( 0 < x \)  
(e) \( 3 \leq x \)

16. Solve the following inequality:

(a) \( \frac{2-k}{3} \leq x \leq \frac{2+k}{3} \)  
(b) \( \frac{2-k}{3} < x < \frac{2+k}{3} \)  
(c) \( \frac{2+k}{3} \leq x \leq \frac{2-k}{3} \)  
(d) \( \frac{2+k}{3} < x < \frac{2-k}{3} \)  
(e) None of these.

17. Express as single fraction in lowest terms without zero or negative exponents:

\[
\frac{3^2 y^2 x^{-2}}{t^3 y} \quad \frac{3^2 y^2}{t^3 y} \quad \frac{3y}{y^4 x^3 y} \quad \frac{3y}{t^3 y} \quad \frac{9x}{y^2}
\]

(a) \( 9y^2/x^2 \)  
(b) \( x^2/9y^2 \)  
(c) \( ty^2/9x \)  
(d) \( 9x/ty^2 \)  
(e) None of these.

18. Solve for \( x \): \( 3^x = 2^{(x + 1)} \)

(a) \( x = \log(2) - \log(1.5) \)  
(b) \( x = \ln(2) - \ln(1.5) \)  
(c) \( x = \ln(2) / \ln(6) \)  
(d) \( x = \log(2)/\log(1.5) \)  
(e) None of these

19. The area of \( \triangle ABC \) is: (See sketch)

(a) \( 5 \sqrt{3} \)  
(b) \( 20 \sqrt{3} \)  
(c) 10  
(d) 20  
(e) None of these.

**ANSWERS:**

1. c  2. b  3. c  4. a  5. b  6. b  7. c  8. d  9. c  10. a  