Calculus Placement Review

1. Given: $f(x) = 5x + 11$ and $g(x) = 3x - 4$, evaluate the composite function: $y = (f \circ g)(x)$

   a) $y = -x - 2$ b) $y = 6x + 9$ c) $y = 15x - 9$ d) $y = 9x - 11$ e) none of these

2. If (x, y) is the solution of the system $\begin{cases} x + 2y = 1 \\ 2x - y = -3 \end{cases}$; Determine the value of $x + y$

   a) -2 b) -1 c) 0 d) 2 e) none of these

3. Given: $f(x) = x^3$, evaluate the following: $f(-a^2)$

   a) $-a^5$ b) $-a^6$ c) $-a^8$ d) a^9 e) none of these

4. A ball is thrown into the air from the surface of the moon. The height of the ball at time t is given by $H(t) = -10t^2 + 70t$. When will the ball hit its maximum height?

   a) $t = -1$ b) $t = 2$ c) $t = 4$ d) $t = 3.5$ e) none of these

5. Solve the equation: $\log_2(x - 1) + \log_2(x + 2) = 5$

   a) $x = -3$ b) $x = 1$ c) $x = 5$ d) $x = 2$ e) none of these

6. Determine the **amplitude** of the function: $f(x) = -3\cos(2x - 2) + 1$

   a) -3 b) $\frac{\pi}{2}$ c) 3 d) 1 e) none of these

7. Determine the **length of the fundamental period** of the function: $f(x) = -3\cos\left(x - \frac{\pi}{2}\right) + 1$

   a) 2π b) π c) $\frac{\pi}{4}$ d) $\frac{\pi}{2}$ e) none of these

8. Given: $f(x) = x^3$, evaluate the following: $f(x + h)$

   a) $x + h$ b) $x^3 + h^3$ c) $x^3 + x^2h + xh^2 + h^3$ d) $x(x + h)$ e) none of these

9. Determine the **domain** of the function: $f(x) = \tan^{-1}(2x)$

   a) All real numbers b) $-\frac{\pi}{4} < x < \frac{\pi}{4}$ c) $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ d) $0 < x < \frac{\pi}{2}$ e) none of these

10. Determine the **horizontal translation** of the function: $f(x) = -3\cos\left(x - \frac{\pi}{2}\right) + 1$

    a) Left $\frac{\pi}{6}$ b) Right $\frac{\pi}{2}$ c) Left $\frac{\pi}{2}$ d) Right 1 e) none of these

11. Determine a solution of the equation: $\sin^2(x) + 2\cos(x) = 1 - \cos^2(x)$

    a) $x = 2\pi$ b) $\sin(x) = 0$ c) $\cos(x) = \frac{1}{2}$ d) $x = \frac{\pi}{3}$ e) none of these

12. Evaluate the following: $\cos\left(\frac{\pi}{4}\right)$

    a) $\frac{1}{2}$ b) $\frac{\sqrt{2}}{2}$ c) $\frac{1}{3}$ d) 0 e) none of these

13. Given $f(x) = x^3$, evaluate the following: $\frac{f(x+h)-f(x)}{h}$

a) 1 b) $\frac{x^3+h^3}{h}$ c) $3x^2 + 3xh + h^2$ d) $3x^2 + h$ e) none of these

14. Solve the equation: $3^{2x-1} = 9^{3x+2}$

a) $x = -3$ b) $x = 1$ c) $x = -\frac{5}{4}$ d) $x = \frac{1}{9}$ e) none of these

15. Determine a solution of the equation: $\tan^2(x) + \cos^2(2x) = \sec^2(x) - 2\sin^2(x)$

a) $x = -\pi$ b) $x = 0$ c) $x = 1$ d) $x = \frac{\pi}{2}$ e) none of these

16. Given: $f(x) = x^2 + 2$ and $g(x) = 2x - 1$, evaluate the composite function $y = (f \circ g)(x)$

a) $y = x^2 - 1$ b) $y = 2x^2 + 3$ c) $y = 4x^2 - 4x + 3$ d) $y = 4x^2 - 4x + 1$ e) none of these

17. Given: $f(x) = 5x + 9$, evaluate the inverse function: $y = f^{-1}(x)$

a) $y = 5x - 9$ b) $y = 5x^2 + 9$ c) $y = 5x - 3$ d) $y = \frac{1}{5}x - \frac{9}{5}$ e) none of these

18. Determine the **vertical translation** of the function: $f(x) = -2\cos\left(x - \frac{\pi}{4}\right) + 1$

a) Left 1 b) Up $\frac{\pi}{4}$ c) Down 1 d) Down $\frac{\pi}{4}$ e) none of these

19. If (x, y) is the solution of the system $\begin{cases} 3x + y = 1 \\ 2x - 3y = 2 \end{cases}$; Determine the value of $x - y$

a) $\frac{1}{11}$ b) $\frac{9}{11}$ c) $\frac{13}{11}$ d) $-\frac{1}{11}$ e) none of these

20. Determine the **vertical asymptote** of the graph: $f(x) = \csc\left(2x - \frac{\pi}{2}\right) - 1$

a) $x = -\frac{\pi}{4}$ b) $x = \frac{\pi}{2}$ c) $x = \frac{3\pi}{8}$ d) $x = \pi$ e) none of these

21. Evaluate the following: $\tan\left(\frac{\pi}{4}\right)$

a) $\frac{\sqrt{3}}{2}$ b) $\frac{1}{\sqrt{2}}$ c) 1 d) 0 e) none of these

22. Determine the **range** of the function: $f(x) = -3\sin 2x$

a) $-3 < f(x) < 3$ b) $-2 \le f(x) \le 2$ c) $-3 \le f(x) \le 3$ d) $0 < f(x) < 3$ e) none of these

23. Solve the equation: $\log_2(x - 1) + \log_2(x + 3) = 4$

a) $x = -1 + 2\sqrt{5}$ b) $x = 1$ c) $x = -2 + \sqrt{11}$ d) $x = -1 \pm 2\sqrt{5}$ e) none of these

24. Determine the **domain** of the function: $f(x) = \ln(2x - 1)$

a) All $x > 0$ b) All $x > \frac{1}{2}$ c) $0 < x < 2$ d) $0 < x < \frac{1}{2}$ e) none of these