

1. Solve $\frac{x}{x-2} - 1 = \frac{8}{x-1}$

(a) -1

(b) $-\frac{7}{3}$

(c) $\frac{7}{3}$

(d) $\frac{3}{7}$

2. Find the radius of the circle $x^2 + y^2 - 6x + 6y + 2 = 0$

(a) $\sqrt{2}$

(b) 4

(c) 8

(d) 16

3. Find the sum of the solutions of the equation $4x^2 + 2x + 1 = 0$

(a) $\frac{1}{2}$

(b) $-\frac{1}{4}$

(c) $-\frac{1}{2}$

(d) -2

4. Solve the inequality $\frac{2x-1}{x+2} \geq -1$

(a) $(-\infty, -2) \cup [-\frac{1}{3}, \infty)$

(b) $(-2, -\frac{1}{3}]$

(c) $(-\infty, -2] \cup [-\frac{1}{3}, \infty)$

(d) $[-2, -\frac{1}{3}]$

5. Find an equation of the line through $(\frac{1}{2}, -\frac{2}{3})$ perpendicular to the line $4x - 8y = 1$

(a) $y = \frac{1}{2}x - \frac{5}{12}$

(b) $y = \frac{1}{2}x + \frac{11}{12}$

(c) $y = -2x + \frac{5}{3}$

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

6. Solve the inequality $3 - |2x + 4| \leq 1$

- (a) $(-\infty, -3] \cup [-1, \infty)$
- (b) $[-3, -1]$
- (c) $[-1, \infty)$
- (d) $[1, 3]$

7. Find the domain of the function $f(x) = \frac{\sqrt{x-1}}{x^2-5x+6}$

- (a) $[1, 2) \cup (2, 3) \cup (3, \infty)$
- (b) $(-\infty, 2) \cup (2, 3) \cup (3, \infty)$
- (c) $[1, \infty)$
- (d) $[1, 2) \cup (3, \infty)$

8. Find the average rate of change of the function $f(x) = 3x^2 + 1$ between $x = 2$ and $x = 2 + h$

- (a) $3h + 12$
- (b) $3h^2 + 1$
- (c) $2h$
- (d) $2 + h$

9. Determine the maximum/minimum of the function $f(x) = 1 + 3x - x^2$

- (a) Minimum is $\frac{3}{2}$
- (b) Maximum is $\frac{3}{2}$
- (c) Minimum is $\frac{13}{4}$
- (d) Maximum is $\frac{13}{4}$

10. Find the inverse of the function $f(x) = \frac{3x-1}{x+2}$

- (a) $f^{-1}(x) = \frac{2x+1}{3-x}$
- (b) $f^{-1}(x) = \frac{3x+1}{x-2}$
- (c) $f^{-1}(x) = \frac{2x-1}{x+3}$
- (d) $f^{-1}(x) = \frac{x-2}{3x+1}$

11. Factor the polynomial $P(x) = x^3 - 2x^2 - 9x + 18$
- (a) $(x + 3)^2(x - 2)$
 - (b) $(x - 2)(x - 3)^2$
 - (c) $(x - 2)(x + 3)(x - 3)$
 - (d) $(x - 3)^2(x + 2)$
12. Find the quotient and remainder of $\frac{2x^4 + 3x^2 - x + 2}{x^2 + 1}$
- (a) quotient $2x^2 + 2x + 1$, remainder $-x + 7$
 - (b) quotient $2x^2 + 2x + 1$, remainder $-x + 1$
 - (c) quotient $2x^2 + 5$, remainder $-x + 7$
 - (d) quotient $2x^2 + 1$, remainder $-x + 1$
13. Find all asymptotes of the function $f(x) = \frac{3x^2}{x^2 - x - 6}$
- (a) horizontal asymptote: $y = 0$, vertical asymptotes: $x = -2, x = 3$
 - (b) horizontal asymptote: $y = 3$, vertical asymptotes: $x = -2, x = 3$
 - (c) horizontal asymptote: $y = 0$, vertical asymptotes: $x = -3, x = 2$
 - (d) horizontal asymptote: $y = 3$, vertical asymptotes: $x = -3, x = 2$
14. Find all zeros of the polynomial $P(x) = x^4 - 5x^3 + 6x^2 + x - 3$
- (a) $-1, -3, \frac{1 \pm \sqrt{5}}{2}$
 - (b) $1, 3$
 - (c) $-1, -3$
 - (d) $1, 3, \frac{1 \pm \sqrt{5}}{2}$
15. Evaluate $\log_{12} 9 + \log_{12} 32 - \log_{12} 2$
- (a) 2
 - (b) $\frac{3}{2}$
 - (c) -2
 - (d) $\frac{1}{2}$

16. Solve the equation $\frac{10}{1+e^{-x}} = 2$ for x .

- (a) $\ln 4$
- (b) $-\ln 8$
- (c) $\ln 8$
- (d) $-\ln 4$

17. Evaluate $\sin 120^\circ \tan 45^\circ$

- (a) $\frac{\sqrt{6}}{4}$
- (b) $-\frac{\sqrt{3}}{2}$
- (c) $\frac{\sqrt{3}}{2}$
- (d) $-\frac{\sqrt{6}}{4}$

18. If $\sec \theta = \sqrt{5}$ and $\sin \theta < 0$, what is $\tan \theta$?

- (a) -5
- (b) 5
- (c) -2
- (d) 2

19. If $b = 13$, $c = 15$ and $\angle B = 30^\circ$, what is $\sin \angle C$?

- (a) $\frac{30}{13}$
- (b) $\frac{15}{26}$
- (c) $\frac{26}{15}$
- (d) $\frac{13}{30}$

20. What is c^2 if $a = 3$, $b = 4$ and $\angle C = 53^\circ$?

- (a) $25 - 24 \cos 53^\circ$
- (b) $25 + 24 \cos 53^\circ$
- (c) $7 - 12 \cos 53^\circ$
- (d) $7 + 12 \cos 53^\circ$

21. Which one of these functions has amplitude 4 and period 2?

- (a) $f(x) = 4 + \cos(x + 2)$
- (b) $f(x) = -4 \sin(\pi x - \frac{1}{2})$
- (c) $f(x) = 4 \tan(\pi x)$
- (d) $f(x) = -4 \cos(x - 2)$

22. Simplify $\frac{\sec x - \cos(-x)}{\tan x}$

- (a) $\sin x$
- (b) $\cos x$
- (c) $\csc x$
- (d) $\sec x$

23. Rewrite $\frac{1}{5} \sin x - \frac{\sqrt{3}}{5} \cos x$ in the form $k \sin(x + \phi)$

- (a) $\frac{2}{5} \sin(x + \frac{\pi}{3})$
- (b) $\frac{2}{5} \sin(x + \frac{\pi}{6})$
- (c) $\frac{2}{5} \sin(x - \frac{\pi}{6})$
- (d) $\frac{2}{5} \sin(x - \frac{\pi}{3})$

24. If $\frac{3\pi}{2} < x < 2\pi$ and $\sin x = -\frac{3}{5}$ determine $\cos \frac{x}{2}$.

- (a) $\frac{3\sqrt{10}}{10}$
- (b) $-\frac{3\sqrt{10}}{10}$
- (c) $\frac{\sqrt{10}}{10}$
- (d) $-\frac{\sqrt{10}}{10}$

25. Calculate $3 \cos 37.5^\circ \cos 7.5^\circ$

- (a) $\frac{3\sqrt{2}-3\sqrt{3}}{4}$
- (b) $\frac{3\sqrt{2}+3\sqrt{3}}{4}$
- (c) $\frac{3\sqrt{2}+3}{4}$
- (d) $\frac{3\sqrt{2}-3}{4}$

26. Evaluate $\sin(2 \cos^{-1} \frac{3}{5})$

- (a) $-\frac{5}{6}$
- (b) $\frac{5}{6}$
- (c) $\frac{6}{5}$
- (d) $\frac{24}{25}$

27. How many solutions does the equation $2 \sin^2(2x) - \cos(2x) = 1$ have with $0 \leq x < 2\pi$?

- (a) 0
- (b) 3
- (c) 6
- (d) infinitely many

28. Determine if the graph of $r^2 + r = \sin(\pi - \theta)$ has any symmetries

- (a) x -axis
- (b) y -axis
- (c) origin
- (d) no symmetries

29. Use DeMoivre's Theorem to evaluate $(\sqrt{3} - i)^6$

- (a) -64
- (b) 64
- (c) $27 - i$
- (d) $27 + i$

30. Determine the sum of the arithmetic sequence $7 + 11 + \cdots + 51$

- (a) 297
- (b) 320
- (c) 348
- (d) 351