

MATH 2412 - Precalculus Prerequisite Review

1. Simplify and express your answer without negative exponents: $\left(\frac{25xy^{-1}z^2}{35x^3y^{-4}z^0}\right)^{-2}$

2. Simplify: $\sqrt[3]{\sqrt{x^{12}}}$

3. Simplify: $\sqrt{50x^3y^4z}$

4. Simplify and give your answer in radical form: $\frac{x^{3/4}(x^{2/3})^{-3/4}}{x^{-1/2}}$

5. Subtract: $(5x^3 - 7x - 2) - (3x^3 - 4x^2 - x + 8)$

6. Multiply: $(3x - 2)(5x^2 - x + 4)$

7. Divide: $(5x^3 - 2x + 7) \div (x - 3)$

8. Divide: $(4x^4 - 5x^2) \div (5 + 2x)$

9. Factor completely: $3x^4 - x^3 - 12x^2 + 4x$

10. Factor completely: $32x^4 - 108x$

11. Factor completely: $16x^4 - 81y^4$

12. Factor completely: $6x^2 + 47xy - 8y^2$

13. Subtract: $\frac{2x - 3}{x^2 - 5x - 6} - \frac{3x - 2}{x^2 - 36}$

14. Divide and simplify: $\frac{x^2 - 6x + 9}{x^2 - 2x - 3} \div \frac{3x^2 - 14x + 15}{3x^2 - 2x - 5}$

15. Rationalize the denominator: $\frac{10}{\sqrt[3]{2x^2}}$

16. Rationalize the denominator: $\frac{\sqrt{x} - 2\sqrt{y}}{3\sqrt{x} + \sqrt{y}}$

17. Rationalize the numerator: $\frac{3\sqrt{x} - 5}{2\sqrt{x} - 3}$

18. Solve: $5 - 2(3x - 4) = 2x - (2x - 6)$

19. Solve: $6x - 3(3x - 5) > 4 - 2(x - 1)$

20. Solve: $12x^2 = 17x - 6$

21. Solve: $5x^2 = 6x + 4$

22. Solve: $x^6 = 6x^3 + 16$

23. Solve: $|2x - 3| - 7 = 4$

24. Solve: $|3x - 5| = |4x - 2|$

25. Solve: $|7x - 3| \geq 4$

26. Solve: $\frac{2x - 3}{2x + 1} = \frac{x - 4}{x - 5}$

27. Solve: $\frac{3}{x - 4} - \frac{5}{x + 2} = \frac{18}{x^2 - 2x - 8}$

28. Solve: $5\sqrt{2x - 3} + 7 = 22$

29. Solve: $\sqrt{x - 3} + 4 = \sqrt{2x + 1} + 2$

30. Solve: $\sqrt[3]{9x - 2} + 12 = 2$

$$31. \text{ Solve the system: } \begin{cases} 2x - 3y + z = 0 \\ 3x + y - 4z = -11 \\ -x + 2y + 3z = -1 \end{cases} \quad 32. \text{ Solve the system graphically: } \begin{cases} 2x - 3y < 6 \\ 3x + 4y \leq 12 \\ x > -3 \\ y \leq 2 \end{cases}$$

33. Give, in slope-intercept form, the equation of the line through $(-2,3)$ and perpendicular to $4x - 2y = 9$.

34. Give, in slope-intercept form, the equation of the line that contains $(5,-3)$ and has its x -intercept at $(-2,0)$.

35. Expand: $(2x - 3)^4$

36. Graph $y = \sqrt{2x + 6}$.

37. (a) What is the domain of $y = \sqrt{2x + 6}$? (b) What is the range of $y = \sqrt{2x + 6}$?

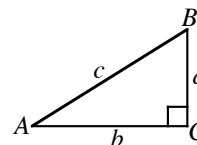
38. For $f(x) = -x^2 - 2x + 4$, determine (a) $f(-3)$ and (b) $f(a + 2)$.

39. For $f(x) = 2x - 3$ and $g(x) = x^2 - 5x + 4$, determine the composite $(g \circ f)(x)$.

40. If $\sin x = 3/5$ and $\cos x < 0$, determine $\tan x$.

41. If $\cos x = -3/4$ and $\tan x > 0$, determine x (a) in degrees, rounded to the nearest tenth of a degree, and (b) in radians, rounded to the nearest thousandth of a radian.

42. In the triangle shown, $a=312$ ft and $B=41.2^\circ$. Determine c , rounded to the nearest tenth of a foot.



43. Use identities to show that the left side of the following equation is equal to the right side.

$$\frac{1}{1 - \sin \theta} - \frac{1}{1 + \sin \theta} = 2 \tan \theta \sec \theta$$

44. (a) Convert $\frac{5\pi}{3}$ radians to degrees. (b) Convert 330° to radians.

45. Evaluate from memory: (a) $\sin \frac{3\pi}{4}$ (b) $\cos \frac{5\pi}{6}$ (c) $\tan \frac{4\pi}{3}$ (d) $\sec \pi$ (e) $\cot \frac{3\pi}{2}$ (f) $\csc 0$

46. Graph $y = \sin x$ for x in the interval $[0, 4\pi]$.

47. Graph $y = \tan x$ for x in the interval $[-2\pi, 2\pi]$.

48. Graph $y = \sec x$ for x in the interval $[0, 4\pi]$.

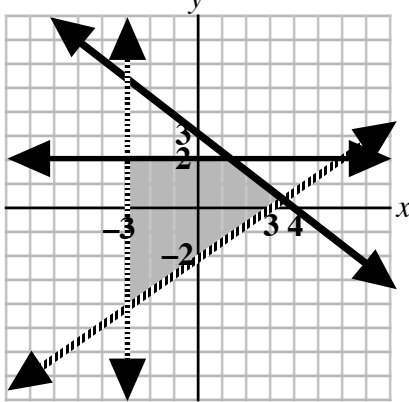
49. Solve for x in the interval $[0, 2\pi)$: $4 \sin^2 x + 2 = 5$

50. Solve for x in the interval $[0, 2\pi)$: $\sin^2 x = \cos^2 x$

Answers

1. $\frac{49x^4}{25y^6z^4}$ 2. x^2 3. $5|x|y^2\sqrt{2xz}$ 4. $\sqrt[4]{x^3}$ 5. $2x^3 + 4x^2 - 6x - 10$
6. $15x^3 - 13x^2 + 14x - 8$ 7. $5x^2 + 15x + 43 + \frac{136}{x-3}$ 8. $2x^3 - 5x^2 + 10x - 25 + \frac{125}{2x+5}$
9. $x(3x-1)(x+2)(x-2)$ 10. $4x(2x-3)(4x^2+6x+9)$ 11. $(4x^2+9y^2)(2x+3y)(2x-3y)$
12. $(6x-y)(x+8y)$ 13. $\frac{-(x-4)^2}{(x+6)(x-6)(x+1)}$ 14. 1 15. $\frac{5\sqrt[3]{4x}}{x}$
16. $\frac{3x-7\sqrt{xy}+2y}{9x-y}$ 17. $\frac{9x-25}{6x+\sqrt{x}-15}$ 18. $\frac{7}{6}$ 19. $(-\infty, 9)$ 20. $\frac{3}{4}, \frac{2}{3}$
21. $\frac{3 \pm \sqrt{29}}{5}$ 22. $2, -\sqrt[3]{2}$ 23. $-4, 7$ 24. $-3, 1$ 25. $(-\infty, -1/7] \cup [1, \infty)$
26. $\frac{19}{6}$ 27. No solution 28. 6 29. 4, 12 30. $\frac{-998}{9}$ 31. $(-3, -2, 0)$

32.

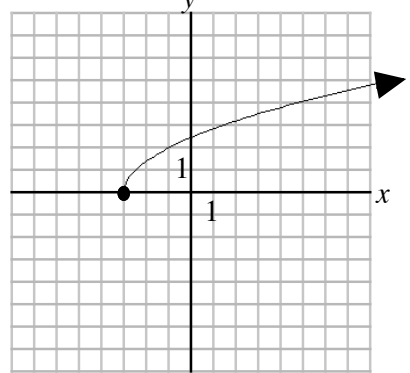


33. $y = -\frac{1}{2}x + 2$

34. $y = -\frac{3}{7}x - \frac{6}{7}$

35. $16x^4 - 96x^3 + 216x^2 - 216x + 81$

36.



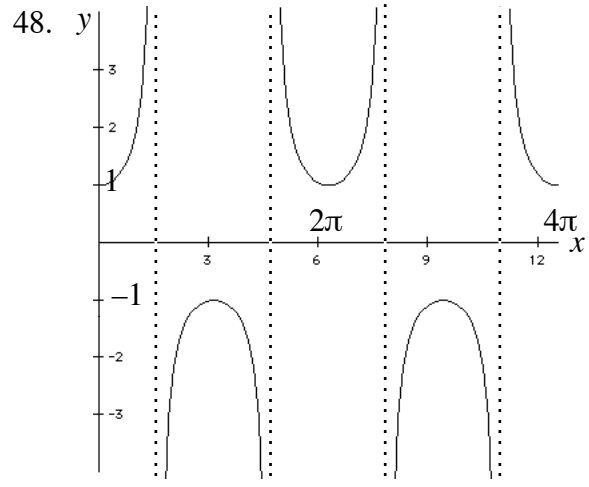
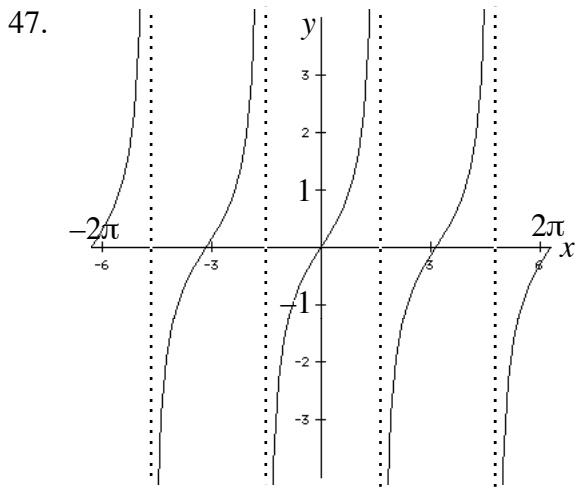
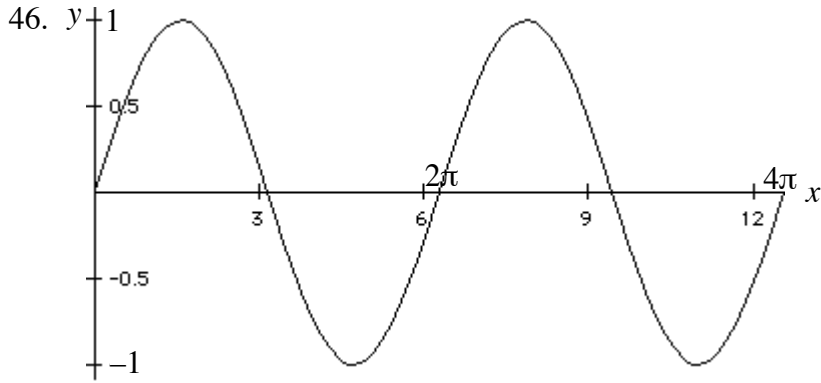
37. (a) $[-3, \infty)$, (b) $[0, \infty)$ 38. (a) 1, (b) $-a^2 - 6a - 4$ 39. $(f \circ g)(x) = 4x^2 - 22x + 28$

40. $-\frac{3}{4}$ 41. (a) 221.4° , (b) 3.864 42. 414.7 ft

$$43. \frac{1 + \sin \theta}{1 + \sin \theta} \cdot \frac{1}{1 - \sin \theta} - \frac{1 - \sin \theta}{1 - \sin \theta} \cdot \frac{1}{1 + \sin \theta} = \frac{1 + \sin \theta}{1 - \sin^2 \theta} - \frac{1 - \sin \theta}{1 - \sin^2 \theta} = \frac{1 + \sin \theta - (1 - \sin \theta)}{1 - \sin^2 \theta} = \frac{2 \sin \theta}{\cos^2 \theta}$$

$$= \frac{2}{1} \cdot \frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\cos \theta} = 2 \tan \theta \sec \theta$$

44. (a) 300° , (b) $\frac{11\pi}{6}$ 45. (a) $\frac{\sqrt{2}}{2}$, (b) $-\frac{\sqrt{3}}{2}$, (c) $\sqrt{3}$, (d) -1 , (e) 0, (f) undefined



49. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

50. $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$