

### Mixed Review Problems

1. Find all roots of  $P(x) = 3x^3 + x^2 + 12x + 4$ .

2. Determine  $f^{-1}(x)$  for  $f(x) = \sqrt{x-3}$ .

3. Solve  $\log_4(x) = 3$ .

4. Express as a single logarithm.

$$3\log_b(\sqrt[3]{x}) - 2\log_b(x)$$

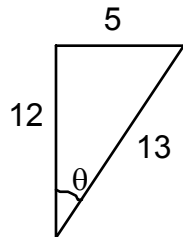
5. Solve  $\sqrt{4y+9} - \sqrt{5y-4} = 1$ .

6. Solve  $\log_3(x+3) + \log_3(x-3) = 4$ .

7. Solve  $4^{x^2+4x} = \frac{1}{64}$ .

8. Simplify  $\frac{y - \frac{1}{y}}{y + \frac{1}{y}}$ .

9. Find  $\sin \theta$ ,  $\cos \theta$ ,  $\tan \theta$ ,  $\csc \theta$ ,  $\sec \theta$ , and  $\cot \theta$  for the triangle shown.



10. Determine the amplitude and period and sketch the graph of  $y = 3\sin(3x)$ .

11. Simplify  $\cos x \sin x (\csc x + \sec x)$ .

12. Simplify  $\frac{\tan x \cos^2 x + \tan x \sin^2 x}{\sin x}$ .

13. Given  $\sin \theta = -\frac{4}{5}$  and  $\pi < \theta < \frac{3\pi}{2}$ , find  $\sin 2\theta$ ,  $\cos 2\theta$ ,  $\tan 2\theta$ , and the quadrant in which  $2\theta$  lies.

14. Evaluate  $\arccos\left(-\frac{1}{2}\right)$ .

15. Evaluate  $\csc^{-1}\left(\frac{2\sqrt{3}}{3}\right)$ .

16. Solve on  $[0, 2\pi]$ .  $2\sin^2 x = 1$

17. Solve on  $[0, 2\pi]$ .  $2\cos^2 x = -3\cos x - 1$

18. Solve on  $[0, 2\pi]$ .  $\cos x = \sin 2x$

19. Evaluate the limit.  $\lim_{x \rightarrow \infty} \frac{4x^2 + 5}{3x^2 - 2x}$

20. Evaluate the limit.  $\lim_{x \rightarrow \infty} \frac{x^3 + 2x^2 - 5}{x^2 + 4}$