

**Factor completely**

1.  $2x^3 + 7x^2 - 14x + 5$

Hint: Find one root and then use synthetic division.

2.  $x^4 - 3x^3 - 4x^2 - 3x - 5$

Hint: graph, approximate the roots numerically, and work backwards to find two of the roots. Then use polynomial division to find the other factor(s).

**Simplify by factoring**

3.  $(3x + 2)^2 (5x - 1)^5 + (3x + 2)^3 (5x - 1)^4$

4.  $24x(3x^2 - 1)^3 (4x + 3)^3 + 12(3x^2 - 1)^4 (4x + 3)^2$

5.  $\frac{32}{3}(3x - 1)^{5/4} (4x + 3)^{5/3} + \frac{15}{4}(3x - 1)^{1/4} (4x + 3)^{8/3}$

6.  $\frac{9}{4}(2x + 1)^{1/3} (3x + 2)^{-1/4} + \frac{2}{3}(2x + 1)^{-2/3} (3x + 2)^{3/4}$

7. 
$$\frac{10(3x - 4)^3 (5x + 3) - 9(5x + 3)^2 (3x - 4)^2}{(3x - 4)^6}$$

There are two angles,  $x$  and  $y$ , such that  $\sin x = \frac{3}{5}$ ,  $\tan y = -\frac{12}{5}$ ,  $0 < x < \frac{\pi}{2}$ , and  $\frac{\pi}{2} < y < \pi$ . Draw two appropriate triangles and use them to find the following.

8.  $\cos x$

12.  $\sin 2y$

16.  $\sin x \sec y$

9.  $\sin(\pi - x)$

13.  $\cos(y - x)$

17.  $\sec(\pi + x)$

10.  $\tan(x - y)$

14.  $\sin(x + y)$

18.  $\cot(-y)$

11.  $\cos^2\left(\frac{x}{2}\right)$

15.  $\cos^2(5x) + \sin^2(5x)$

19.  $\sec^2 y + \csc^2 x$