

Differentiate the following.

1.  $g(x) = \sqrt{x^2 - 2x + 1}$

2.  $f(x) = \log_{10} \cos x$

3.  $h(t) = \left( \frac{t^2}{t^3 + 2} \right)^2$

4.  $g(t) = \sqrt{\frac{1}{t^2 - 2}}$

5.  $g(x) = 3 \tan 4x$

6.  $g(\theta) = \sec\left(\frac{1}{2}\theta\right) \tan\left(\frac{1}{2}\theta\right)$

7.  $g(v) = \frac{\cos v}{\csc v}$

8.  $h(t) = 2 \cot^2(\pi t + 2)$

9.  $y = 3x - 5 \cos(\pi x)^2$

10.  $y = \ln\left(\frac{2x}{x+3}\right)^7$

Find the equation of the tangent line to the graph of  $f$  at the indicated  $x$ -value

11.  $f(x) = \sqrt{3x^2 - 2}$   $x = 3$

12.  $f(x) = \frac{1}{3}x\sqrt{x^2 + 5}$   $x = 2$

13.  $f(x) = \sin 2x$   $x = \pi$

14.  $f(x) = \tan^2 x$   $x = \frac{\pi}{4}$

Find the second derivative of the following functions.

15.  $f(x) = 2(x^2 - 1)^3$

16.  $g(x) = \frac{1}{x-2}$

17.  $f(x) = \sin x^2$

18.  $h(\theta) = \sec^2 \pi\theta$