Lesson Worksheet

January 24, 2018

1. Find the derivative
   (a) $y = 3e^x + \sin x$
   (b) $y = 3x^e$
   (c) $f(x) = 5x^{-4/5}$
2. If $y = 3x^{0.1}$, find $\left.\dfrac{dy}{dx}\right|_{x=10}$ (the derivative evaluated at $x = 10$). Round your answer to 4 decimal places.
3. Find the equation of the tangent line to $f(x) = \sin x$ at $x = \pi/3$.
4. Find the x-value at which $f(x) = x^2 + 3x$ has derivative 4.
5. Find the derivative
   (a) $h(x) = \dfrac{-2}{x^3}$
   (b) $s(t) = \dfrac{1}{\sqrt[3]{t^2}}$
   (c) $g(t) = t(t^2 - 1)$
   (d) $T(x) = \dfrac{x^2 - 1}{\sqrt{x}}$
   (e) $f(x) = \dfrac{1}{\sec x}$

Answers:

1. (a) $y' = 3e^x + \cos x$
   (b) $y' = 3ex^{e-1}$
   (c) $f'(x) = -4x^{-9/5}$
2. 0.0378
3. $y = \frac{1}{2}x - \frac{\pi}{6} + \frac{\sqrt{3}}{2}$
4. $x = \frac{-1}{2}$
5. (a) $h'(x) = 6x^{-4}$
   (b) $s'(t) = \frac{-2}{3}t^{-5/3}$
   (c) $g'(t) = 3t^2 - 1$
   (d) $T'(x) = \frac{3}{2}\sqrt{x} + \frac{1}{2}x^{-1/2}$
   (e) $f'(x) = -\sin x$