

1. Question Details SCalc8 2.3.001. [3354261]

Differentiate the function.

$f(x) = 2^{80}$

$f'(x) = 0$

$\frac{d}{dx}[c] = 0 \quad 2^{80} \text{ is constant}$

2. Question Details SCalc8 2.3.003. [3354352]

Differentiate the function.

$f(x) = 5.9x + 2.8$

$f'(x) = m = 5.9$

3. Question Details SCalc8 2.3.004. [3354176]

Differentiate the function.

$g(x) = \frac{7}{8}x^2 - 5x + 15$

$g'(x) = \frac{7}{4}x^1 - 5$

4. Question Details SCalc8 2.3.007. [3354347]

Differentiate the function.

$g(x) = x^2(1 - 6x)$

$= x^2 - 6x^3 \Rightarrow$

$g'(x) = 2x - 18x^2 = -18x^2 + 2x \quad \checkmark$

$$\begin{aligned} g'(x) &= 2x(1-6x) + x^2(-6) \\ &= 2x - 12x^2 - 6x^2 \\ &= -18x^2 + 2x \end{aligned}$$

5. Question Details SCalc8 2.3.009. [3354288]

Differentiate the function.

$g(t) = 4t^{-1/8}$

$\Rightarrow g'(t) = \left(-\frac{1}{8}\right)(4)t^{-9/8} = -\frac{1}{2}t^{-9/8}$

$-\frac{1}{8} - \frac{0}{8} = -\frac{1}{8}$

$\frac{-1}{2\sqrt[8]{t^9}} \text{ , etc.}$

6. Question Details SCalc8 2.3.010.

Differentiate the function.

$$B(y) = cy^{-8} \Rightarrow B'(y) = -8cy^{-9}$$

7. Question Details SCalc8 2.3.016.

Differentiate the function.

$$S(R) = 8\pi R^2 \Rightarrow 16\pi R = S'(R) = \frac{dS}{dR}$$

8. Question Details iCalc8 2.3.017.MI.

Differentiate the function.

$$y = \frac{4x^2 + 6x + 6}{\sqrt{x}} = \frac{4x^2}{x^{1/2}} + \frac{6x}{x^{1/2}} + \frac{6}{x^{1/2}} = 4x^{3/2} + 6x^{1/2} + 6x^{-1/2}$$

$$\Rightarrow y' = y'(x) = \frac{dy}{dx} = 6x^{1/2} + 6x^{-1/2} - 3x^{-3/2}$$

Don't use quotient rule, unless you gotta.

9. Question Details Calc8 2.3.027.M

Differentiate.

$$F(y) = \left(\frac{1}{y^2} - \frac{9}{y^4}\right)(y + 5y^3) = (y^{-2} - 9y^{-4})(y + 5y^3)$$

Product Rule:

$$(fg)' = f'g + fg'$$

$$F'(y) = (-2y^{-3} + 36y^{-5})(y + 5y^3) + (y^{-2} - 9y^{-4})(1 + 15y^2)$$

MADE MISTAKE HERE

STOP THERE ON TEST

~~$$= -2y^{-2} - 10(36y^{-4}) + 18y^{-2} + y^{-2} + 35y^4(9y^{-4}) - 315y^2$$

$$35y^4 + 315y^2 - 10 + 179y^{-2} + 27y^{-4} = F'(y)$$~~

$$F(y) = y^{-1} + 5y - 9y^{-3} - 45y^{-1}$$

$$\Rightarrow F'(y) = 46y^{-1} + 5y - 9y^{-3}$$

$$F'(y) = 5y + 46y^{-1} - 9y^{-3}$$

10. Question Details SCalc8 2.3.029.

Differentiate.

$$g(x) = \frac{9 + 8x}{7 - 2x}$$

$$\left(\frac{f}{h}\right)' = \frac{f'h - fh'}{h^2}$$

$$\frac{8(7-2x) + (8x+9)(+2)}{(-2x+7)^2} = \frac{56-16x+16x+18}{(-2x+7)^2} = \frac{74}{(-2x+7)^2}$$

STOP HERE ON TEST

11. Question Details SCalc8 2.3.036

Differentiate.

$$y = \frac{\sqrt{x}}{4+x} = \frac{x^{\frac{1}{2}}}{x+4}$$

$$\Rightarrow y' = \frac{(\frac{1}{2}x^{-\frac{1}{2}})(x+4) - (x^{\frac{1}{2}})(1)}{(x+4)^2} = \frac{\frac{1}{2}x^{\frac{1}{2}} + 2x^{-\frac{1}{2}} - x^{\frac{1}{2}}}{(x+4)^2}$$

$$= \frac{-\frac{1}{2}\sqrt{x} + \frac{2}{\sqrt{x}}}{(x+4)^2}$$

Can't split the denominator.
Need Quotient Rule

12. Question Details SCalc8 2.3.037

Differentiate.

$$f(t) = \frac{\sqrt[3]{t}}{t-9} = \frac{t^{\frac{1}{3}}}{t-9}$$

$$\Rightarrow f'(t) = \frac{(\frac{1}{3}t^{-\frac{2}{3}})(t-9) - (t^{\frac{1}{3}})(1)}{(t-9)^2} = \frac{\frac{1}{3}t^{\frac{1}{3}} - 3t^{-\frac{2}{3}} - t^{\frac{1}{3}}}{(t-9)^2}$$

$$= \frac{-\frac{2}{3}t^{\frac{1}{3}} - 3t^{-\frac{2}{3}}}{(t-9)^2}$$

$$\frac{f'g - fg'}{g^2} = \frac{\frac{-\frac{1}{2}x+2}{\sqrt{x}}}{(x+4)^2} = \frac{-\frac{1}{2}x+2}{\sqrt{x}(x+4)^2}$$

13. Question Details SCalc8 2.3.043

Differentiate.

$$f(w) = \frac{w}{w + \frac{2}{w}} = \frac{w}{w + 2w^{-1}}$$

$$\Rightarrow f'(w) = \frac{1(w + 2w^{-1}) - w(1 - 2w^{-2})}{(w + 2w^{-1})^2}$$

14. Question Details SCalc8 2.3.051. [3354341]

Find an equation of the tangent line to the curve at the given point.

$$f(x) = y = \frac{4x}{x+1}, \quad (3, 3)$$

$$f'(x) = \frac{4(x+1) - 4x(1)}{(x+1)^2}$$

$$\Rightarrow f'(3) = \frac{4(3+1) - 4(3)}{(3+1)^2}$$

$$= \frac{16-12}{16} = \frac{4}{16} = \frac{1}{4} = m_{\text{tan}} = f'(x_1) = f'(3)$$

Equation of tangent line to

 $f(x)$ at $x = x_1$ is:

$$y = f'(x_1)(x - x_1) + f(x_1)$$

$$= m(x - x_1) + y_1$$

$$y = \frac{1}{4}(x-3) + 3 \quad \text{Slop!}$$

15. Question Details

SCalc8 2.3.053. [3354165]

(a) The curve $y = 1/(1 + x^2)$ is called a **witch of Maria Agnesi**. Find an equation of the tangent line to this curve at the point $(-1, \frac{1}{2})$.

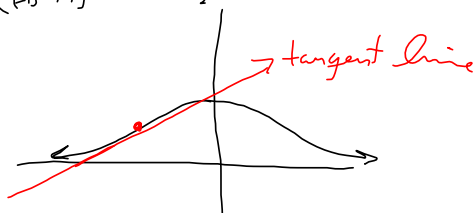
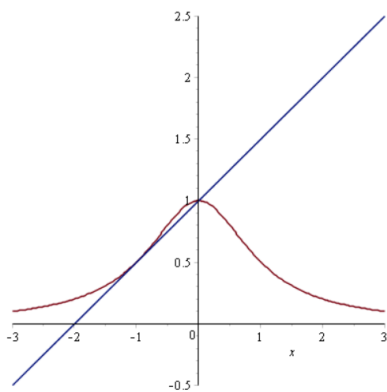
(b) Illustrate part (a) by graphing the curve and tangent line on the same screen.

$$f(x) = \frac{1}{x^2+1}$$

$$f'(x) = \frac{0(x^2+1) - 1(2x)}{(x^2+1)^2} = \frac{-2x}{(x^2+1)^2}$$

$$\Rightarrow f'(-1) = \frac{-2(-1)}{((-1)^2+1)^2} = \frac{2}{2^2} = \frac{1}{2}$$

$$y = \frac{1}{2}(x+1) + \frac{1}{2}$$



16. Question Details

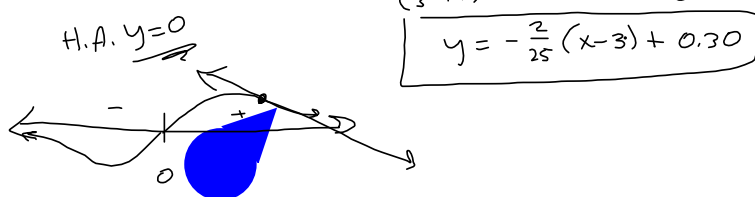
SCalc8 2.3.054. [3868819]

(a) The curve $y = x/(1 + x^2)$ is called a **serpentine**. Find an equation of the tangent line to this curve at the point $(3, 0.30)$.

(b) Illustrate part (a) by graphing the curve and tangent line on the same screen.

$$f(x) = \frac{x}{x^2+1} \Rightarrow f'(x) = \frac{1(x^2+1) - x(2x)}{(x^2+1)^2}$$

$$\Rightarrow f'(3) = \frac{3^2+1 - (3)(2(3))}{(3^2+1)^2} = \frac{10 - 18}{10^2} = \frac{-8}{100} = \frac{-2}{25} = m$$



17. Question Details

SCalc8 2.3.058. [3354227]

Find equations of the tangent line and normal line to the curve at the given point.

18. Question Details

SCalc8 2.3.060. [3354316]

Find the first and second derivative of the function.

$$G(r) = \sqrt{r} + \sqrt[6]{r}$$

19. [Question Details](#) SCalc8 2.3.061. [3354121]

Find the first and second derivatives of the function.

$$f(x) = \frac{x^2}{1 + 6x}$$

20. [Question Details](#) SCalc8 2.3.065. [3354365] -

Biologists have proposed a cubic polynomial to model the length L of rock bass at age A :

$$L = 0.0155A^3 - 0.372A^2 + 3.95A + 1.21$$

where L is measured in inches and A in years. Calculate

$$\left. \frac{dL}{dA} \right|_{A=11}. \text{ (Round your answer to three decimal places.)}$$

Interpret your answer.

21. [Question Details](#) SCalc8 2.3.069. [3354369]

Suppose that $f(5) = 1$, $f'(5) = 3$, $g(5) = -4$, and $g'(5) = 6$. Find the following values.

(a) $(fg)'(5)$

(b) $(f/g)'(5)$

(c) $(g/f)'(5)$

22. [Question Details](#) SCalc8 2.3.072

If $h(2) = 8$ and $h'(2) = -9$, find

$$\left. \frac{d}{dx} \left(\frac{h(x)}{x} \right) \right|_{x=2}.$$

23. [Question Details](#) SCalc8 2.3.076. [3354325]

If f is a differentiable function, find an expression for the derivative of each of the following functions.

(a) $y = x^8 f(x)$

(b) $y = \frac{f(x)}{x^6}$

(c) $y = \frac{x^7}{f(x)}$

24. [Question Details](#)

SCalc8 2.3.078.MI. [3391735]

For what values of x does the graph of $f(x)$ have a horizontal tangent? (Enter your answers as a comma-separated list.)

$$f(x) = x^3 + 9x^2 + x + 3$$

25. [Question Details](#)

SCalc8 2.3.083. [3354465]

Find an equation of the normal line to the curve $y = \sqrt{x}$ that is parallel to the line $2x + y = 1$.

26. [Question Details](#)

SCalc8 2.3.089. [3354574]

Find a second-degree polynomial P such that $P(3) = 6$, $P'(3) = 7$, and $P''(3) = 4$.