

3.2**Exercises**

1. Find the derivative of $y = (x^2 + 1)(x^3 + 1)$ in two ways: by using the Product Rule and by performing the multiplication

28. (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

Product Rule and these figures to estimate the rate at which total personal income was rising in Miami–Ft. Lauderdale in

(b) Taking $f = g = h$ in part (a), show that

38. A manufacturer produces bolts of a fabric with a fixed width. The quantity q of this fabric (measured in yards) that is sold is a function of the selling price p (in dollars per yard), so we can write $q = f(p)$. Then the total revenue earned with selling price p is $R(p) = pf(p)$.

(a) What does it mean to say that $f(20) = 10,000$ and $f'(20) = -350$?

(b) Assuming the values in part (a), find $R'(20)$ and interpret your answer.

39. How many tangent lines to the curve $y = x/(x + 1)$ pass through the point $(1, 2)$? At which points do these tangent lines

(c) Use part (b) to differentiate $y = e^{3x}$.

42. (a) Use the definition of a derivative to prove the **Reciprocal Rule**: If g is differentiable, then

$$\frac{d}{dx} \left(\frac{1}{g(x)} \right) = -\frac{g'(x)}{[g(x)]^2}$$

(b) Use the Reciprocal Rule to differentiate the function in Exercise 19.

43. Use the Reciprocal Rule to verify that the Power Rule is valid