Name:_____

9.1 Derivative Exercises

Exercise 9.1.1 Differentiate the following functions.

a. $f(x) = x^{43}$

b. $z = \dfrac{1}{t^7}$

c. $P = \sqrt[5]{t^2}$

d. $h(x) = \dfrac{1}{\sqrt{x}}$

e. $z = 7t^4$

f. $P = \dfrac{-8}{t^4}$

g. $P(x) = -7\sin(x)$

h. $z(x) = \pi\tan(x)$

i. $T = 4\sqrt{t}$

j. $V(r) = \dfrac{\pi r^3}{3}$

k. $f(r) = \dfrac{Gm_1m_2}{r^2}$

l. $T = \sin(t) - 2\cos(t) + 3$

m. $r(x) = \dfrac{x}{5} + 7$

n. $k(\theta) = \dfrac{4\sec(\theta) - 3\csc(\theta)}{4}$

o. $r = \dfrac{x}{3\sqrt[3]{x}} - \dfrac{2\sin(x)}{9} + \ln(2)$

p. $z(\alpha) = e\alpha^{\pi}$

q. $z = \dfrac{8}{\sqrt{t^7}}$

r. $y(u) = 12\sqrt[3]{u}$

s. $T = \dfrac{4\sqrt[3]{t^7}}{t^2}$

t. $f(x) = \dfrac{\sqrt[11]{x^6}}{6}$

9.2 Leibniz Notation

Exercise 9.2.1 Write the Leibniz notation for each of the following expressions.

a. The derivative with respect to β of $\cos(\beta)$.

b. The derivative with respect to x of $\dfrac{dy}{dx}$.

c. The derivative with respect to t of $\ln(x)$.

d. The derivative of z with respect to x.

e. The derivative with respect to t of $g(8)$.

9.3 Tangent and Normal Lines

Exercise 9.3.1 Determine the equations of the tangent line and normal line to the curve $f(x) = x + \sqrt{x}$ at the point $(1, 2)$. Draw the tangent and normal lines on the same coordinate plane as $y = f(x)$ shown below.