

**Week-In-Review #6**

1. Find derivatives of the following:

(a)  $f(x) = x^2 + 7x^3 - \pi x + 6$

(b)  $g(x) = \sqrt[4]{x^3} - \frac{1}{x^3} + ex$

(c)  $h(x) = \frac{4x^3 - 7x + 2}{x^4}$

(d)  $r(x) = 5x^2 \left( 2\sqrt{x} + \frac{3}{x^5} - 7 \right)$

(e)  $k(x) = (7x^4 - 10x + \sqrt{x}) \left( \frac{1}{x} - \frac{2}{\sqrt[3]{x}} + 8 \right)$

(f)  $y = \frac{(5x^4 + \sqrt[5]{x^8} - 2x)}{(3x^6 - 9)}$

$$(g) m(x) = 3(8 - 4x^2)^3$$

$$(h) g(x) = -2\sqrt[5]{(x^2 + 4)^2}$$

$$(i) n(x) = \frac{10}{\sqrt{7+x}}$$

$$(j) y = (3x - 4x^7)^2(2\sqrt{x} - 6)^3$$

$$(k) f(x) = \frac{(2x^8 - 6x^5 + 1)^4}{(x - 7)(x + 3)^2}$$

$$(l) y = \sqrt[3]{(2x + 5)^4(3x^2 - 7)^6}$$

2. Find the value(s) of  $x$  where  $f(x) = \frac{x}{x^2 + 4}$  has a horizontal tangent line.

3. Find the equation of the tangent line to the following functions at the indicated point.

(a)  $f(x) = 5\sqrt{6x^2 + 4}$  at  $x = 0$

(b)  $g(x) = x^2(x - 1)^3$  at  $(2, 4)$

4. A ball is thrown vertically upward from the ground at a velocity of 64 ft/sec. Its distance from the ground at  $t$  seconds is given by  $s(t) = -16t^2 + 64t$ .

(a) Find the velocity function,  $v(t)$ .

(b) How fast is the ball moving 2 seconds after being thrown? 3 seconds after being thrown?

(c) How long after the ball is thrown does it reach its maximum height?

(d) How high will the ball go?

(e) When does the ball hit the ground?

5. A particular book is sold at a price according to the price-demand function,  $p(x) = -0.5x + 50$ . It costs a total of \$650 to produce 75 of these books and there are \$275 of fixed costs associated with producing the books. If  $x$  represents the number of these books that are made and sold, find the following.

(a)  $C(x)$ ,  $R(x)$ , and  $P(x)$

(b) Marginal cost, marginal revenue, and marginal profit functions

(c)  $R'(10)$  and interpret.

6. The total cost (in dollars) of producing  $x$  items is given by  $C(x) = 500 + 40x + 0.05x^2$ .

(a) Find the average cost function.

(b) Find the marginal cost function.

(c) Find the marginal average cost function.

(d) Find the average cost per unit if 20 items are produced.

(e) Find the marginal average cost at a production level of 20 items and interpret.

(f) Estimate the average cost per item (using the information found above) if 21 items are produced.