Intermediate Calculus Review Name______________________
2.2-2.6

Find the derivative.

1) $f(x) = x^3 + 2x - 4$

2) $f(x) = \dfrac{-6x^3 + 3x^2 - 2x + 1}{x^2}$

3) $g(x) = \dfrac{3x^2}{4} + \dfrac{5}{x}$

4) $g(x) = x(2x+5)^2$

5) $f(x) = 6x^3(5x^2 + 2x - 1)$

6) $f(x) = x^2(x-5)^2$

7) $f(x) = x^3 + 2x - 4$

8) $f(x) = \dfrac{2x+3}{x-2}$

9) $f(x) = \sqrt{x+5}$

10) $h(x) = 5\sqrt{x+2}$

11) $f(x) = x^{\frac{2}{3}}$

12) $f(x) = \dfrac{2x-3}{(x-1)^2}$

13) $f(x) = \dfrac{3}{\sqrt{x^2 - 3}}$

14) $f(x) = (8x-9)^{-4}$

15) $f(x) = \dfrac{1}{2x^4}$

16) $f(x) = \dfrac{2}{\sqrt{x}}$

17) $f(x) = \dfrac{x}{(2x-5)^3}$

18) $f(x) = \dfrac{x^2 - 3x + 1}{x^2 - 1}$

19) The ozone level (in parts per billion) on a summer day in a city is given by

$P(t) = 50 + 15t - t^2$ where t is time in hours and t=0 corresponds to 9AM

(A) Find the ozone level and instantaneous rate of change of ozone level at noon
(B) Write a brief verbal interpretation of these results.

20) The financial department of a hospital arrived at the cost equation

$$C(x) = 20x^3 - 360x^2 + 2300x - 1000$$
$$1 < x < 12$$

where C(x) is the cost in thousands of dollars for handling x thousand cases per month.

(A) Write the equation for the average cost function.
(B) Graph the average cost function on your calculator and sketch the graph.
(C) What is the minimum average cost per case to the nearest dollar?

21) A company manufactures and sells x transistor radios per week. If the weekly cost and price-demand equations are

$$C(x) = 5000 + 2x$$
$$p = 10 - 0.001x \quad 0 \le x \le 10{,}000$$

Find the following for each week.

(A) The maximum revenue.
(B) The maximum profit.
(C) The production level that will realize the maximum profit.
(D) The price the company should charge to realize the maximum profit.

22) The cost, $C$ (in dollars) to produce $g$ gallons of ice cream can be expressed as $C = f(g)$. Using units, explain the meaning of the following statements.

(A) $f(200) = 350$
(B) $f'(200) = 1.4$
(C) Estimate $f(201)$

23) The ozone level (in parts per billion) on a summer day in a city is given by

$P(t) = 50 + 15t - t^2$ where t is time in hours and t=0 corresponds to 9AM

(A) Find the ozone level and instantaneous rate of change of ozone level at noon. Show Work!!
(B) Write a brief verbal interpretation of these results

24) A ball is thrown straight up into the air from the roof of a building. The height of the ball as measured from the ground is given by $h(t) = -16t^2 + 24t + 120$ where h(t) is measured in feet and $t$ in seconds.

a) Find the velocity function
b) Find the acceleration function
c) What is the velocity at 3 seconds?
d) What is the acceleration at 3 seconds?

25) A rock thrown vertically upward from the surface of the moon at a velocity of $24\,{}^{m}\!/_{s}$ reaches a height of $h(t) = 24t - 0.8t^2$ meters in *t* seconds.

a) Find the velocity function
b) Find the acceleration function
c) How long did it take the rock to reach its highest point?
d) How high did the rock go?
e) How long was the rock aloft?

26) An automobile starts from rest and travels down a straight section of road. The distance y (in feet) of the car from the starting position after x seconds is given by $f(x) = 10x^2$. Find the instantaneous velocity at x=4 seconds.

For the following functions, find (a) the slope of the graph at x=2, and (b) the equation of the tangent line at x=2 in the form y=mx+b.

a)__________b)________ 27) $f(x) = x^2 + 3x + 4$

a)__________b)________ 28) $f(x) = x(x + 1)^2$

________________________29) Find the value(s) of x where the tangent line is horizontal.

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

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

________________30) $f(x) = x^3 + x, \quad (1,-2)$ 31) $f(x) = 5\sqrt[3]{x} + 3\sqrt[5]{x}, \quad (1,2)$

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