Chapter 5 Review Homework

Part A: Algebra Review

1. Factor the following expressions into the form $y = (x + a)(x + b)$ for some real numbers a and b.

a. $y = x^2 + 4x + 2$ b. $y = x^2 - 5 + 4$ c. $y = x^2 + 2 - 3$

d. $f(x) = 2x^2 + 7x + 3$ e. $y = x^2 + 10x + 25$

2. Rewrite the following expressions such that it contains only terms of the form ax^n.

a. $\sqrt[3]{x}$ b. $\frac{3}{\sqrt{x}}$ c. $\frac{4x^3-2x^2}{x}$ d. $\frac{x^3-5}{\sqrt[3]{3x^2}}$

Part B: Chapter 5 Review

1. Find the derivative of each function:

a. $y = cos(x^2 - 3x + 8)$ b. $g(x) = (2x + 3)(\sqrt{4x^2 - 3x + 5})$

c. $f(x) = tan(2x^3 + x - 2)$ d. $y = \frac{sin(3x-2)}{\sqrt{2x^3+6}}$

e. $(x - 3)(x^3 - 3x + 8)$ f. $\frac{(3x^4+8x^2-5x)}{(5x^2-7x+8)}$

2. Given $h(x) = 2x^3 + 3x^2 - 12x$, find the maximum and minimum values of the function on the interval [-3,3].

3. Given $f(x) = x^3 - 3x^2 + 12$. What is the absolute *maximum* value of *f* on the closed interval $[-2, 4]$?

4. Integrate.

a. $\int_{-2}^{1} (z^2 - 7z + 3)\, dz$

b. $\int (2\sqrt{x} + sin(x) + \frac{1}{\sqrt[3]{x}})dx$

c. $\int_{4}^{-3} (cos(x) - \frac{3}{x^5})dx$

d. $\int_{1}^{2} (\frac{1}{7z} + \frac{\sqrt[3]{z^2}}{4} - \frac{1}{2z^3})dz$

5. Simplify using the Fundamental Theorem of Calculus.

a. $\frac{d}{dx}\int_2^x 4tan(\sqrt[3]{x})$

b. $\int \frac{d}{dx} 4tan(\sqrt[3]{x})$

c. $\frac{d}{dx}\int_2^7 4tan(\sqrt[3]{x})$

d. $\frac{d}{dx}\int_2^{x^2} (sin(t^3))dx$

6. The position function of a particle is $x(t) = 30t - 5t^2$.

a. Find the velocity function x(t).

b. Find the velocity when t=2

c. When is the particle stationary?

7. The position function of a particle is $x(t) = 4sin(2\pi t)$.

a. Find the velocity function x(t).

b. Find the velocity when t = 1.

8. A ball is thrown upward from the roof of a 32-foot building with velocity 112 ft/s. The height after t seconds is given by $h(t) = -16t^2 + 112t + 32$.

a. Find the maximum height that the ball reaches.

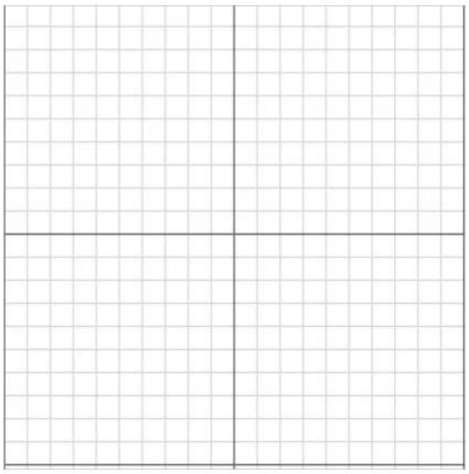
b. Find the velocity of the ball when it hits the ground.

9. Draw a graph and then determine the area bounded by $y = x^2\, x = 0,\ x = 1$, and $y = 4$.

10. Draw a graph and then determine the area bounded by $y = x^2,\ y = 0,$ and $x = 2$.

11. Sketch a graph that satisfies the following conditions:

- $\lim_{x \to \infty} f(x) = 3$
- $f'(2) = 0$
- $f''(x) \leq 0$ for $2 < x < 4$
- $f'(-4) = 0$



12. What do the following situations tell you about the graph of the function?

a. $f'(3) = 0$

b. $f'(3) = 0$ and $f''(3) = -2$

c. $g''(x) > 0$ for all x

d. $g'(7) > 0$

e. $f'(x) < 0$ for $x > 3$, $f'(x) > 0$ for $x < 3$, and $f'(3) = 0$

13. Evaluate the following limits.

a. $\lim_{x \to 2}(8 - 3x + 12x^2)$

b. $\lim_{x \to 5} \frac{x^2 - 25x}{x^2 + 2x - 15}$

c. $\lim_{z \to 4} \frac{\sqrt{z} - 2}{z - 4}$

14. Given $h(x) = x^3 - 6x^2$, find the intervals for which h(x) is increasing, decreasing, concave up, and concave down.

15. If $f'(x) = 2x - 5$ and $f(-4) = 2$, find the equation of f(x).