Final Exam Review: Worksheet 1

1. For each of the functions below, determine whether it is even, odd, or neither:

(a). $f(x) = -3x^2 + 4$
(b). $f(x) = 2x^3 - 4x$
(c). $f(x) = x^3 - \sin(3x)$
(d). $f(x) = x^3 + \cos(3x)$
(e). $f(x) = 2x^3 - 3x^3 - 4x + 4$

2. Use the Intermediate Value Theorem to show that $f(x) = x^3 + x$ takes on the value 9 for some $x \in (1, 2)$.

3. If $f(x) = \frac{x}{x+1}$, the expression $\frac{f(1+h)-f(1)}{h}$ can be simplified to:

(a). $\frac{h}{h+1}$
(b). $\frac{-1}{4+2h}$
(c). $\frac{-1}{2h+1}$
(d). $\frac{1}{4}$

4. If

$$A = \lim_{x \to 1} \frac{x+2}{x(x-3)} \quad \text{and} \quad B = \lim_{x \to 1} \frac{x^2 - 3x + 2}{x^2 + x - 2}$$

then:

(a). $A = \frac{3}{2}$ and B dne;
(b). $A = -\frac{3}{2}$ and $B = 3$;
(c). $A = -\frac{3}{2}$ and $B = -\frac{1}{3}$;
(d). Both A and B dne.

5. If

$$A = \lim_{x \to 3^+} \frac{x(x+1)}{3-x} \quad \text{and} \quad B = \lim_{x \to \infty} \frac{(x^2+2)(3x^2-5)}{x^4+6}$$

then:

(a). $A = -\infty$ and $B = -10/6$;
(b). $A = 0$ and $B = 0$;
(c). $A = \infty$ and $B = \infty$;
(d). $A = -\infty$ and $B = 3$.

6. If $f(2) = 3$ and $f'(2) = -1$, what is the equation of the tangent line to the graph of $y = f(x)$ at the point where $x = 2$?

(a). $y = 5 - x$;
(b). $y = 7 - x$;
(c). $y = 3x - 1$;
(d). $y = x + 1$.

7. An armadillo is walking along a straight road and is

$$s(t) = 12t^2 - t^3$$

inches along the road after t minutes ($0 \le t \le 8$). What is its acceleration when $t = 2$?

(a). $6\, in/min^2$;
(b). $12\, in/min$;
(c). $12\, in/min^2$;
(d). $-12\, in/min^2$.

8. Suppose f is continuous on $[-3, 6]$ with $f(-3) = -1$ and $f(6) = 3$. The Intermediate Value Theorem, applied to f, guarantees that:

(a). $f(0) = 0$;
(b). $f'(c) = \frac{4}{9}$ for at least one value $c \in (-3, 6)$;
(c). $-1 \le f(x) \le 3$ for all $x \in [-3, 6]$;
(d). $f(c) = 1$ for at least one $c \in (-3, 6)$;
(e). $f(c) = 0$ for at least one $c \in (-1, 3)$.