Name: ______________________________________

Extrema on an Interval

Exercise 1: Find the critical numbers, if any, for each of the following functions.

1) $f(x)=5x-11$

2) $f(x)=x^2+6x-8$

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

4) $f(x)=\begin{cases} x^2-4x, & x\in(-\infty,1) \\ x-4, & x\in[1,\infty) \end{cases}$

5) $f(x)=x^5$

6) $f(x)=5x^{1/5}$

7) $f(x)=\frac{x^3}{x^2+1}$

8) $f(x)=\frac{x}{(x+1)^2}$

Exercise 2: Explain why $x=2$ is not a critical number for the function $f(x)=\frac{1}{x-2}$.

Exercise 3: Determine the absolute extrema for the function on the given interval.

1) $f(x)=2x-5$; $[-3,4]$

2) $f(x)=4-x^2$; $[-1,2]$

3) $f(x)=x^3-3x^2-9x+4$; $[-3,4]$

4) $f(x)=\begin{cases} 4-x, & x\in(-\infty,1] \\ x^2+2, & x\in(1,\infty) \end{cases}$; $[-1,3]$

5) $f(x)=6x^{2/3}-4x$; $[-1/8,8]$

6) $f(x)=\left|x^2-2x-3\right|$; $[-2,5]$

7) $f(x)=\frac{2}{x-1}$; $[2,5]$

8) $f(x)=\frac{27}{x^2+9}$; $[-2,3]$

9) $f(x)=3x^{1/3}$; $[-1,1]$

10) $f(x)=x\sqrt{3-x}$; $[-1,3]$

11) $f(x)=2x+\frac{8}{x}$; $[-4,-1]$

Exercise 4: Find the absolute maximum value and the absolute minimum value of the function $f(x) = x^2 + 2x$ over the interval [-3, 1].

Exercise 5: Find the absolute maximum value and the absolute minimum value of the function $f(x) = 3x^4 - 4x^3$ on the interval [-1, 2].

Exercise 6: Find the *x* coordinates of the absolute extrema of the function $f(x) = 3x^{\frac{2}{3}} - 2x$ on the interval [-1, 1].

Exercise 7: The weekly demand for the Pulsar 25-in color console television is given by the demand equation $p = -0.05x + 600, \quad 0 \le x \le 12000$, where *p* denotes the wholesale unit price in dollars and *x* denotes the quantity demanded. The weekly total cost function associated with manufacturing these sets is given by $C(x) = 0.000002x^3 - 0.03x^2 + 400x + 80{,}000$ where *C*(*x*) denotes the total cost incurred in producing *x* sets. Find the level of production that will yield a maximum profit for the manufacturer.