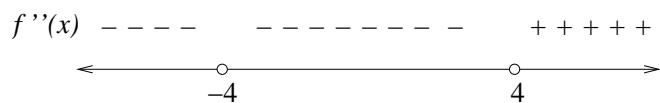
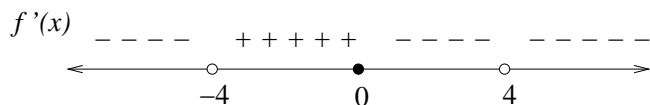


Math 142 - Week in Review #8

1. Sketch the graph of a function f that satisfies the following:

- Domain: $(-\infty, 4) \cup (4, \infty)$
- Vertical asymptotes: $x = 4$
- Horizontal asymptote: $y = -2$
- x -intercepts: $(6, 0)$; y -intercept: $(0, -3)$



2. Sketch the graph of a function f that satisfies the following:

- Domain: All real numbers where $x \neq -3$
- x -intercepts: $(-2, 0)$ and $(2, 0)$; y -intercept: $(0, 4)$
- Vertical asymptotes: none
- $\lim_{x \rightarrow -\infty} f(x) = \infty$ and $\lim_{x \rightarrow \infty} f(x) = 0$
- $f'(x) > 0$ on $(-2, 0) \cup (4, \infty)$
- $f'(x) < 0$ on $(-\infty, -3), (-3, -2) \cup (0, 4)$
- $f''(x) > 0$ on $(-\infty, -3) \cup (-3, -1) \cup (1, 6)$
- $f''(x) < 0$ on $(-1, 1) \cup (6, \infty)$

3. Use the given graph to find the absolute extrema (locations and values) of $f(x)$ on each of the intervals below.

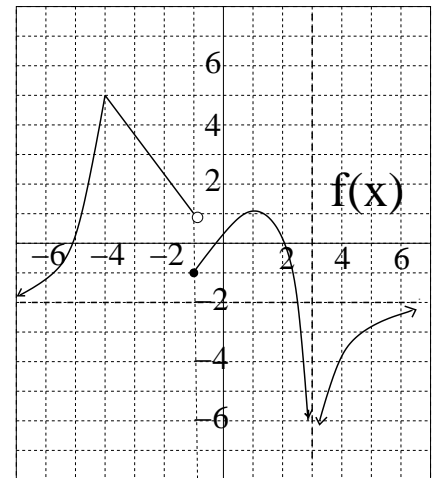
(a) $[-5, 0]$

(b) $[-1, 2]$

(c) $[1, 5]$

(d) $(0, \infty)$

(e) $(-\infty, -1)$



4. Find the absolute extrema (locations and values) of $f(x) = x^2 e^{-0.1x}$ on

(a) $[-5, 30]$

(b) $[-4, 8]$

5. Find all local extrema of each of the given functions on its domain. Use the Second Derivative Test when it applies.

(a) $f(x) = x^4 - 4x^3 - 80x^2 - 120$

(b) $g(x) = -0.2x + \ln(5x - 20)$

(c) $h(x) = 2x^5 - 15x^4 - 90x^3 + 75$

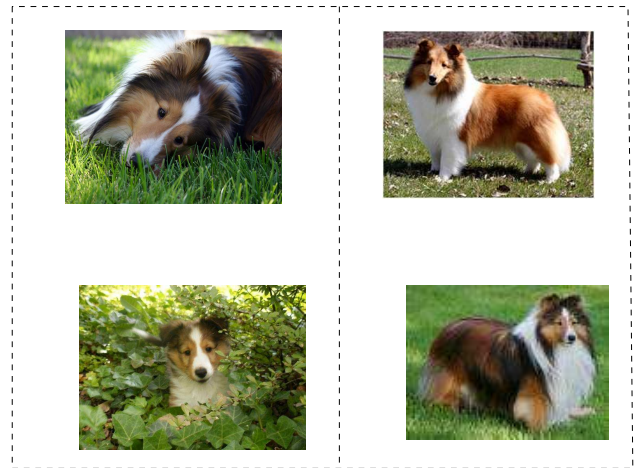
6. Each of the following functions has one absolute extremum on the provided interval. Find the location and value of the absolute extremum and classify it as an absolute maximum or absolute minimum.

(a) $f(x) = \frac{2x}{e^{0.5x}}$ on the interval $(0, \infty)$

(b) $g(x) = -2x * \ln x + 4x$ on the interval $(0, \infty)$

(c) $h(x) = 10 - 2x - \frac{12}{x^2}$ on the interval $(0, \infty)$

7. Marcy wants to build 4 dog runs to raise shelties with 1600 feet of fencing. What dimensions will maximize the total area of the space for her dogs?



8. Marcy decided to instead fence in a rectangular area of $32,550 \text{ ft}^2$ in her back yard. She would like for the fence to extend the same distance to the left and right of the back side of her house, which is 80 feet wide. Material for the sides of the fence that extend on each side of the back side of the house costs \$50 per linear foot, and material for the other three sides costs \$25 per linear foot. Find the dimensions of the fenced area that minimizes cost.

9. Inventory Control - Nan's Grand Pianos sell 480 grand pianos during the year. Their supplier charges Nan \$2600 for each piano, plus a shipping and handling charge of \$675 for each order placed. The Warehouse Around The Corner charges Nan \$720 to store a piano for a year. Let x represent the number of pianos ordered each time.

a. Find the expression which represents the cost of one order.

b. Find the expression for the storage costs.

c. Find the function, C_I , which represents the inventory costs.

d. How many pianos should Nan order at one time to minimize inventory costs?

10. Apply the graphing strategy to sketch the graph of $f(x) = \frac{3x^2 - 10x + 8}{x^2 - 4}$.

11. Find **ALL** asymptotes for each of the following functions:

a. $f(x) = \frac{2x^2 - 5x + 10}{x - 1}$

b. $g(x) = \frac{5x^2 - 14x - 3}{2x^2 - 18}$

c. $h(x) = 4x + 5 - \frac{2x}{x^2 - 10}$

d. $F(x) = \frac{4x^3 - 6x^2 + 2}{x^2 + 4}$