MA 16010 LESSONS 21: GRAPHICAL INTERPRETATION OF DERIVATIVES

So far, we have learned that:

x-value	**1. Critical Point/Number:**	x-values where $f'(x) = 0$ or $f'(x)$ DNE
interval	**2. Increasing:**	$f'(x) > 0$
interval	**3. Decreasing:**	$f'(x) < 0$
x-value x-value	**4. Relative Max:** **5. Relative Min:**	Create # line from (2) and (3), and then use First Derivative Test
interval	**6. Concave Up:**	$f''(x) > 0$
interval	**7. Concave Down:**	$f''(x) < 0$
x-value	**8. Inflection Point:**	Check for change of concavity from results of (6) and (7)

1. Given the graph of $f'(x)$ below, answer the following question for $f(x)$.
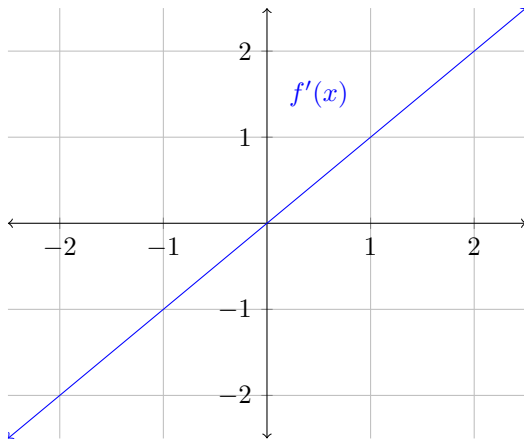
$f'(x)$

(a) **Critical Number(s):**

(b) **Increasing Interval(s):**

(c) **Decreasing Interval(s):**
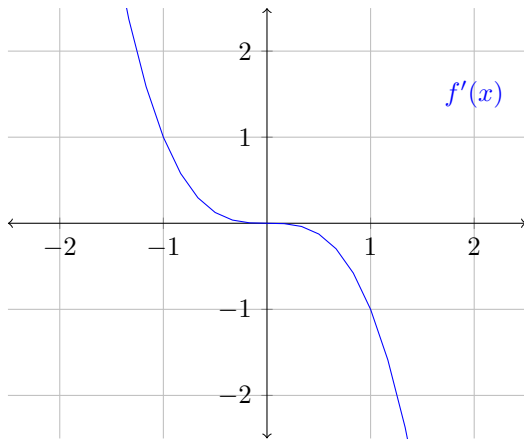
(d) **Relative Maximum Occurs:**

(e) **Relative Minimum Occurs:**

(f) **Concave Up Interval(s):**

(g) **Concave Down Interval(s):**

(h) **Inflection Point(s):**

2. Given the graph of $f'(x)$ below, answer the following question for $f(x)$.

$f'(x)$

(a) **Critical Number(s):**

(b) **Increasing Interval(s):**

(c) **Decreasing Interval(s):**

(d) **Relative Maximum Occurs:**

(e) **Relative Minimum Occurs:**

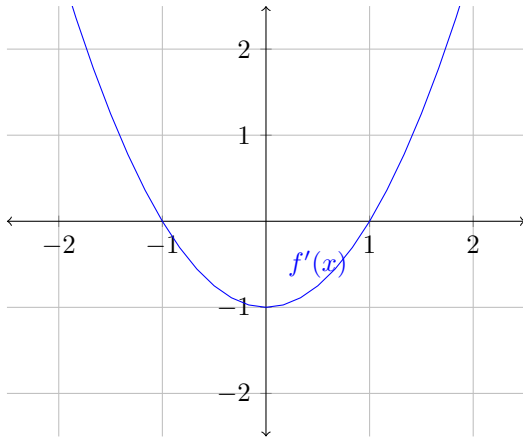(f) **Concave Up Interval(s):**

(g) **Concave Down Interval(s):**

(h) **Inflection Point(s):**

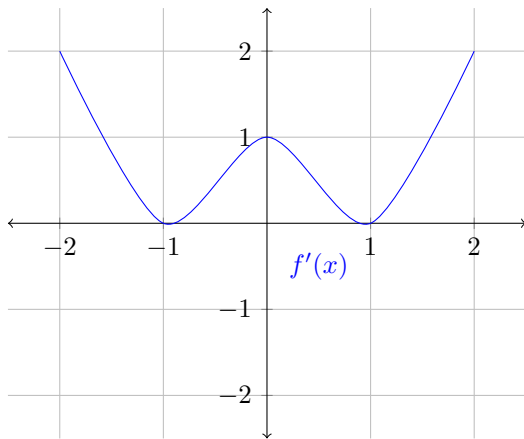3. Given the graph of $f'(x)$ below, answer the following question for $f(x)$.

$f'(x)$

(a) **Critical Number(s):**

(b) **Increasing Interval(s):**

(c) **Decreasing Interval(s):**

(d) **Relative Maximum Occurs:**

(e) **Relative Minimum Occurs:**

(f) **Concave Up Interval(s):**

(g) **Concave Down Interval(s):**

(h) **Inflection Point(s):**

4. Given the graph of $f'(x)$ below, answer the following question for $f(x)$.

$f'(x)$

(a) **Critical Number(s):**

(b) **Increasing Interval(s):**

(c) **Decreasing Interval(s):**

(d) **Relative Maximum Occurs:**

(e) **Relative Minimum Occurs:**

(f) **Concave Up Interval(s):**

(g) **Concave Down Interval(s):**

(h) **Inflection Point(s):**

Summary: When given the graph of f' ,

    1. Critical Point/Number: Where the graph touches/crosses the
                                           x-axis

    2. Increasing: Where the graph is above the x-axis

    3. Decreasing: Where the graph is below the x-axis

    4. Relative Max: Create # line from (2) and (3), and
    5. Relative Min: then use First Derivative Test

    6. Concave Up: Where the slope of f' is positive

    7. Concave Down: Where the slope of f' is negative

    8. Inflection Point: Create a # line with (6) and (7) and
                                      check for changes in sign