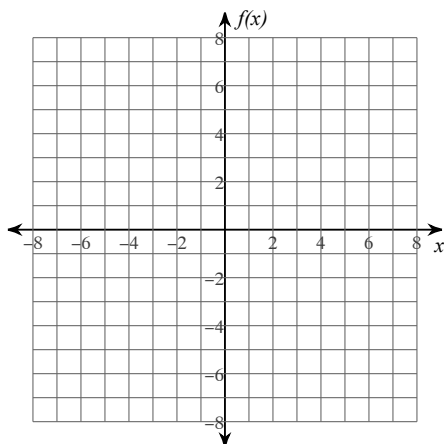


Curve Sketching Practice

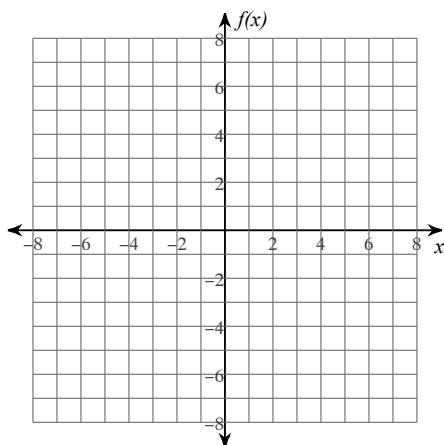
Date _____ Period _____

For each problem, find the: x and y intercepts, x-coordinates of the critical points, open intervals where the function is increasing and decreasing, x-coordinates of the inflection points, open intervals where the function is concave up and concave down, and relative minima and maxima. Using this information, sketch the graph of the function.

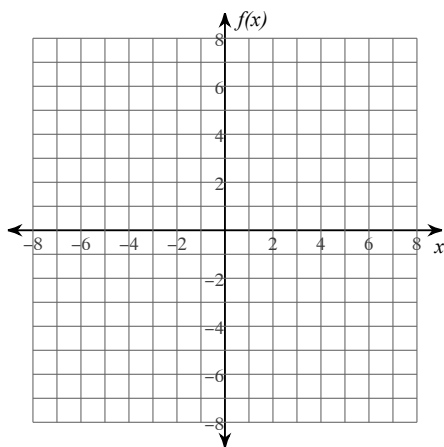
1) $f(x) = -x^3 + 3x^2$



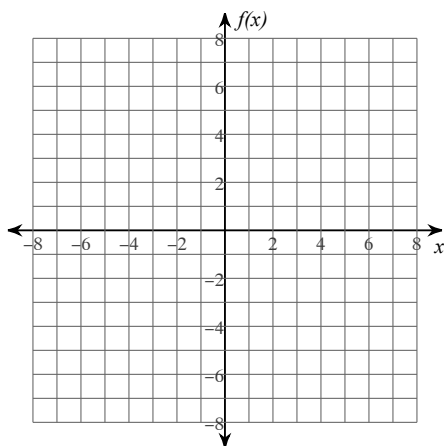
2) $f(x) = \frac{x^4}{8} - \frac{x^2}{2} + \frac{1}{2}$



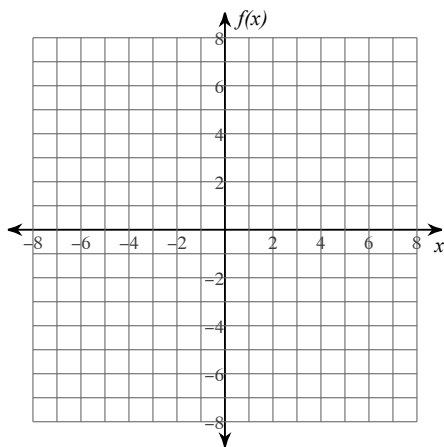
3) $f(x) = x^3 - x^2 - x$



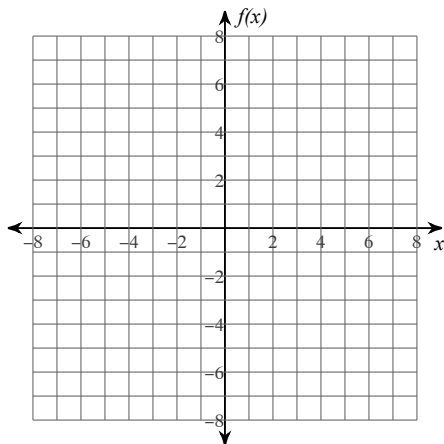
4) $f(x) = \frac{x^4}{8} - \frac{x^2}{4}$



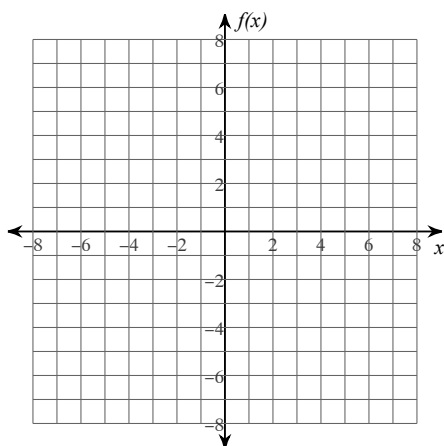
5) $f(x) = -\frac{x^4}{2} + 2x^2$



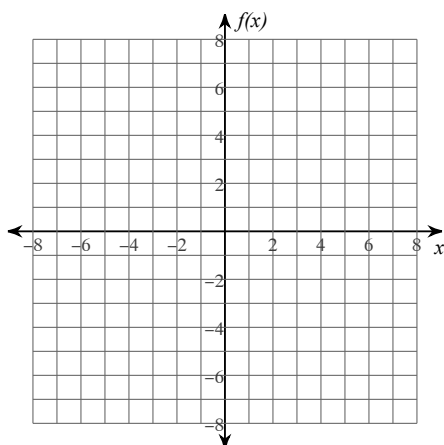
$$6) f(x) = \frac{1}{x+3}$$



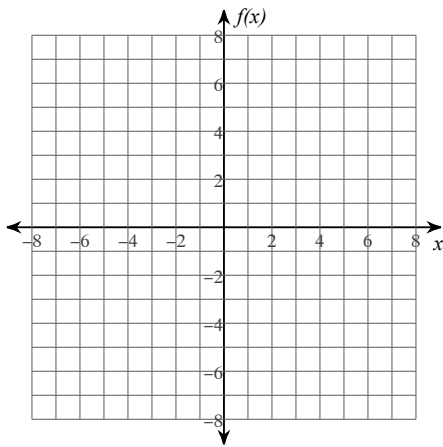
$$7) f(x) = -\frac{x^3}{12} + \frac{x^2}{12}$$



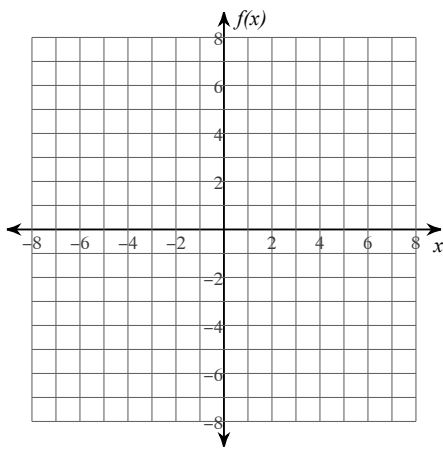
$$8) f(x) = \frac{x^3}{6} + \frac{x^2}{6} - \frac{5x}{6}$$



9) $f(x) = -x^2$

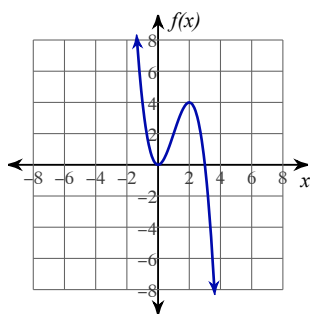


10) $f(x) = \frac{x^2}{2} - 2x + 1$



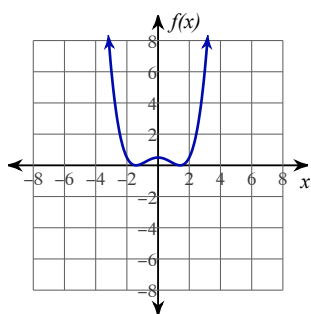
Answers to Curve Sketching Practice (ID: 1)

1)



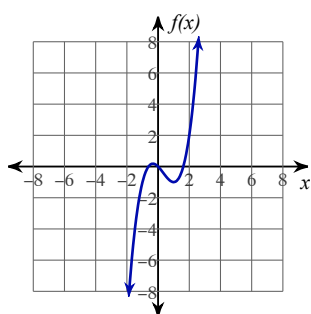
x-intercepts at $x = 0, 3$ y-intercept at $y = 0$
 Critical points at: $x = 0, 2$
 Increasing: $(0, 2)$ Decreasing: $(-\infty, 0), (2, \infty)$
 Inflection point at: $x = 1$
 Concave up: $(-\infty, 1)$ Concave down: $(1, \infty)$
 Relative minimum: $(0, 0)$ Relative maximum: $(2, 4)$

2)



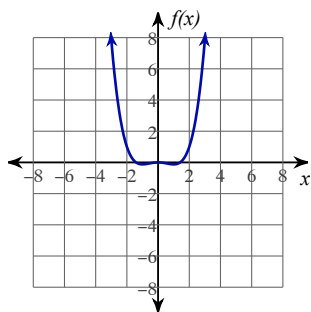
x-intercepts at $x = -\sqrt{2}, \sqrt{2}$ y-intercept at $y = \frac{1}{2}$
 Critical points at: $x = -\sqrt{2}, 0, \sqrt{2}$
 Increasing: $(-\sqrt{2}, 0), (\sqrt{2}, \infty)$ Decreasing: $(-\infty, -\sqrt{2}), (0, \sqrt{2})$
 Inflection points at: $x = -\frac{\sqrt{6}}{3}, \frac{\sqrt{6}}{3}$
 Concave up: $(-\infty, -\frac{\sqrt{6}}{3}), (\frac{\sqrt{6}}{3}, \infty)$ Concave down: $(-\frac{\sqrt{6}}{3}, \frac{\sqrt{6}}{3})$
 Relative minima: $(-\sqrt{2}, 0), (\sqrt{2}, 0)$ Relative maximum: $(0, \frac{1}{2})$

3)



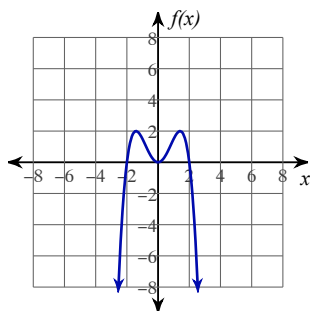
x-intercepts at $x = \frac{1 - \sqrt{5}}{2}, 0, \frac{1 + \sqrt{5}}{2}$ y-intercept at $y = 0$
 Critical points at: $x = -\frac{1}{3}, 1$
 Increasing: $(-\infty, -\frac{1}{3}), (1, \infty)$ Decreasing: $(-\frac{1}{3}, 1)$
 Inflection point at: $x = \frac{1}{3}$
 Concave up: $(\frac{1}{3}, \infty)$ Concave down: $(-\infty, \frac{1}{3})$
 Relative minimum: $(1, -1)$ Relative maximum: $(-\frac{1}{3}, \frac{5}{27})$

4)



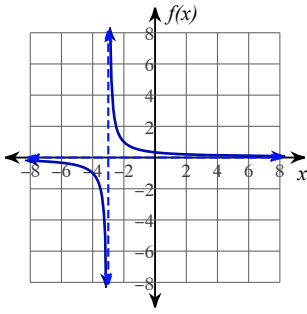
x-intercepts at $x = -\sqrt{2}, 0, \sqrt{2}$ y-intercept at $y = 0$
 Critical points at: $x = -1, 0, 1$
 Increasing: $(-1, 0), (1, \infty)$ Decreasing: $(-\infty, -1), (0, 1)$
 Inflection points at: $x = -\frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3}$
 Concave up: $(-\infty, -\frac{\sqrt{3}}{3}), (\frac{\sqrt{3}}{3}, \infty)$ Concave down: $(-\frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3})$
 Relative minima: $(-1, -\frac{1}{8}), (1, -\frac{1}{8})$ Relative maximum: $(0, 0)$

5)



x-intercepts at $x = -2, 0, 2$ y-intercept at $y = 0$
 Critical points at: $x = -\sqrt{2}, 0, \sqrt{2}$
 Increasing: $(-\infty, -\sqrt{2}), (0, \sqrt{2})$ Decreasing: $(-\sqrt{2}, 0), (\sqrt{2}, \infty)$
 Inflection points at: $x = -\frac{\sqrt{6}}{3}, \frac{\sqrt{6}}{3}$
 Concave up: $(-\frac{\sqrt{6}}{3}, \frac{\sqrt{6}}{3})$ Concave down: $(-\infty, -\frac{\sqrt{6}}{3}), (\frac{\sqrt{6}}{3}, \infty)$
 Relative minimum: $(0, 0)$ Relative maxima: $(-\sqrt{2}, 2), (\sqrt{2}, 2)$

6)



No x -intercepts. y -intercept at $y = \frac{1}{3}$

No critical points exist.

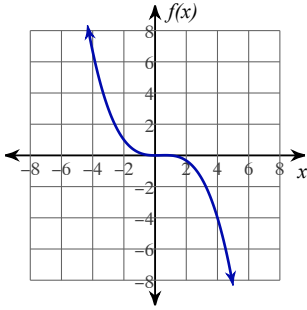
Increasing: No intervals exist. Decreasing: $(-\infty, -3), (-3, \infty)$

No inflection points exist.

Concave up: $(-3, \infty)$ Concave down: $(-\infty, -3)$

No relative minima. No relative maxima.

7)



x -intercepts at $x = 0, 1$ y -intercept at $y = 0$

Critical points at: $x = 0, \frac{2}{3}$

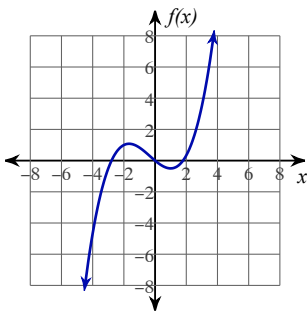
Increasing: $(0, \frac{2}{3})$ Decreasing: $(-\infty, 0), (\frac{2}{3}, \infty)$

Inflection point at: $x = \frac{1}{3}$

Concave up: $(-\infty, \frac{1}{3})$ Concave down: $(\frac{1}{3}, \infty)$

Relative minimum: $(0, 0)$ Relative maximum: $(\frac{2}{3}, \frac{1}{81})$

8)



x -intercepts at $x = \frac{-1 - \sqrt{21}}{2}, 0, \frac{-1 + \sqrt{21}}{2}$ y -intercept at $y = 0$

Critical points at: $x = -\frac{5}{3}, 1$

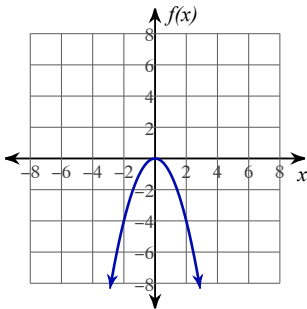
Increasing: $(-\infty, -\frac{5}{3}), (1, \infty)$ Decreasing: $(-\frac{5}{3}, 1)$

Inflection point at: $x = -\frac{1}{3}$

Concave up: $(-\frac{1}{3}, \infty)$ Concave down: $(-\infty, -\frac{1}{3})$

Relative minimum: $(1, -\frac{1}{2})$ Relative maximum: $(-\frac{5}{3}, \frac{175}{162})$

9)



x -intercept at $x = 0$ y -intercept at $y = 0$

Critical point at: $x = 0$

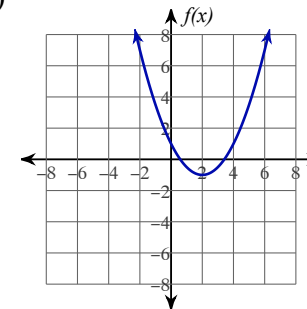
Increasing: $(-\infty, 0)$ Decreasing: $(0, \infty)$

No inflection points exist.

Concave up: No intervals exist. Concave down: $(-\infty, \infty)$

No relative minima. Relative maximum: $(0, 0)$

10)



x -intercepts at $x = 2 - \sqrt{2}, 2 + \sqrt{2}$ y -intercept at $y = 1$

Critical point at: $x = 2$

Increasing: $(2, \infty)$ Decreasing: $(-\infty, 2)$

No inflection points exist.

Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.

Relative minimum: $(2, -1)$ No relative maxima.