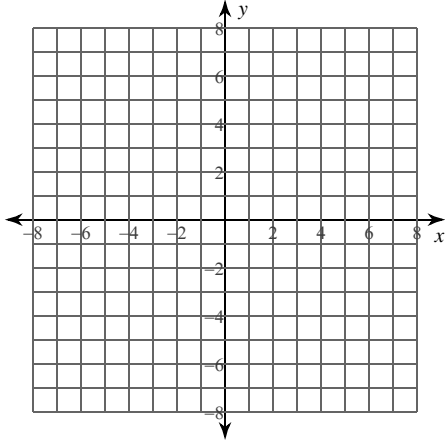


Graphs of Polynomial Functions

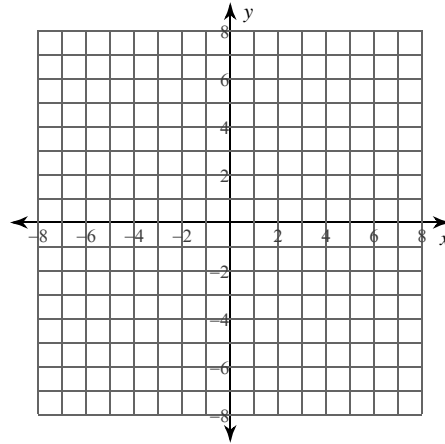
Date _____ Period _____

For each function: (1) determine the real zeros and state the multiplicity of any repeated zeros, (2) list the x-intercepts where the graph crosses the x-axis and those where it does not cross the x-axis, and (3) sketch the graph.

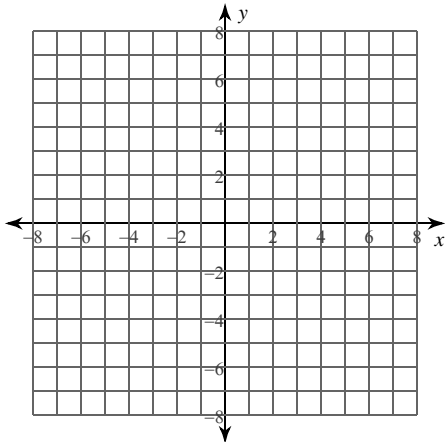
1) $f(x) = -x^3$



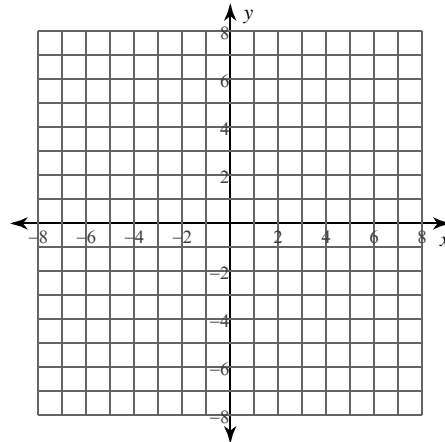
2) $f(x) = 2x^3 - 3x^2$



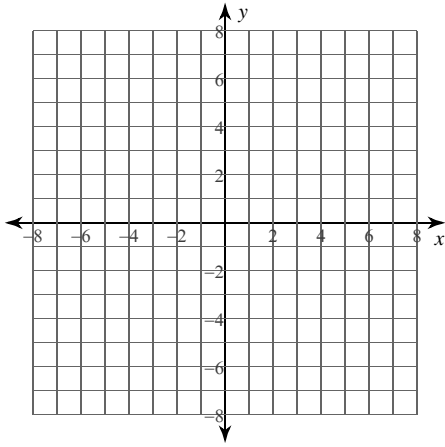
3) $f(x) = x^4 + x^3 - 4x^2 - 4x$



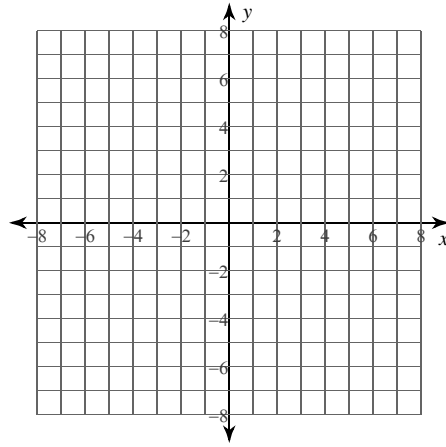
4) $f(x) = x^4 + x^3$



5) $f(x) = -x^3 + 6x^2 - 12x + 8$



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



Describe the end behavior of each function.

7) $f(x) = -x^5 + 2x^3 - x + 1$

8) $f(x) = 2x^2 - 4x - 3$

9) $f(x) = x^4 - 2x^2 - x + 1$

10) $f(x) = -x^3 - 9x^2 - 24x - 20$

11) $f(x) = -x^5 + 3x^3 + 1$

12) $f(x) = x^2 + 6x + 6$

Critical thinking questions:

- 13) Write a polynomial function f with the following properties:
- (a) Zeros at 1, 2, and 3
 - (b) $f(x) \leq 0$ for all values of x
 - (c) Degree greater than 1

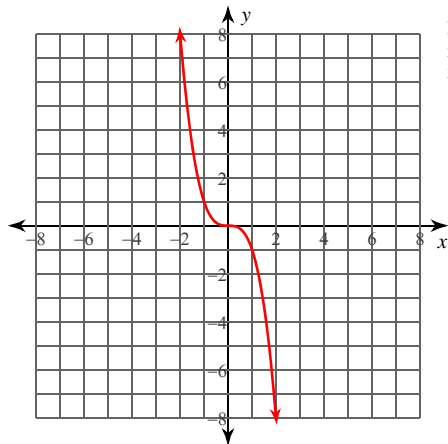
- 14) Write a polynomial function g with degree greater than one that passes through the points $(0, 1)$, $(1, 1)$, and $(2, 1)$.

Graphs of Polynomial Functions

Date _____ Period _____

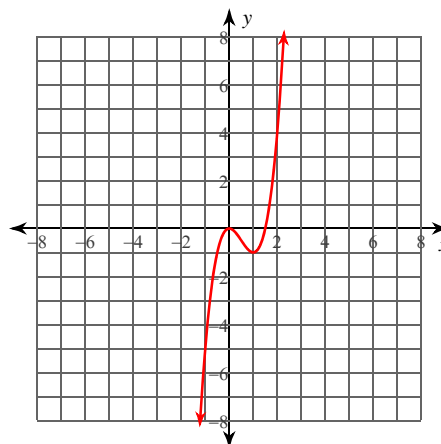
For each function: (1) determine the real zeros and state the multiplicity of any repeated zeros, (2) list the x-intercepts where the graph crosses the x-axis and those where it does not cross the x-axis, and (3) sketch the graph.

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



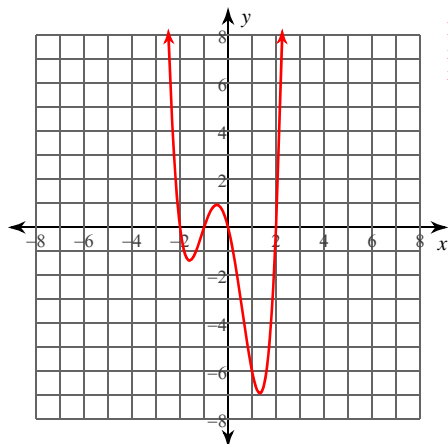
Real zeros: $\{0 \text{ mult. } 3\}$
 x-int, crosses: 0
 x-int, doesn't cross: None

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



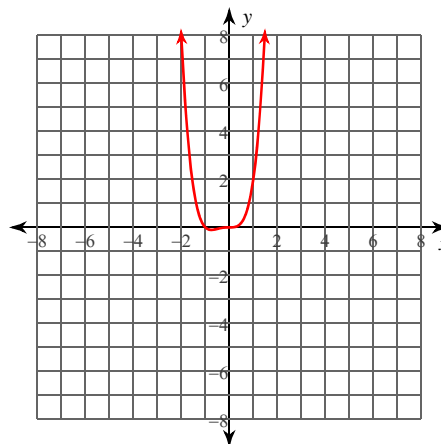
Real zeros: $\left\{0 \text{ mult. } 2, \frac{3}{2}\right\}$
 x-int, crosses: $\frac{3}{2}$
 x-int, doesn't cross: 0

3) $f(x) = x^4 + x^3 - 4x^2 - 4x$



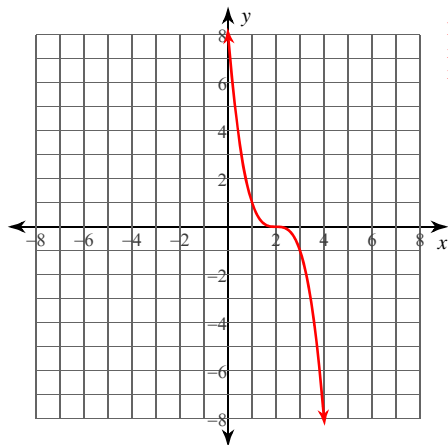
Real zeros: $\{0, 2, -2, -1\}$
 x-int, crosses: 0, 2, -2, -1
 x-int, doesn't cross: None

4) $f(x) = x^4 + x^3$



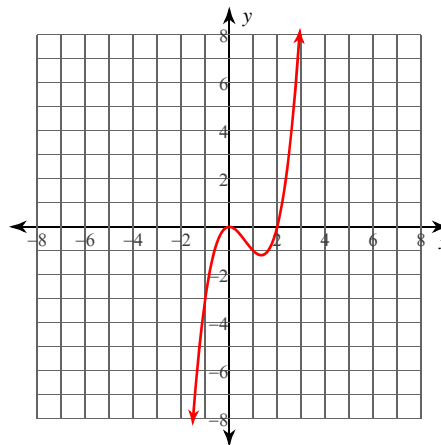
Real zeros: $\{0 \text{ mult. } 3, -1\}$
 x-int, crosses: 0, -1
 x-int, doesn't cross: None

$$5) f(x) = -x^3 + 6x^2 - 12x + 8$$



Real zeros: [2 mult. 3]
 x-int, crosses: 2
 x-int, doesn't cross: None

$$6) f(x) = x^3 - 2x^2$$



Real zeros: [0 mult. 2, 2]
 x-int, crosses: 2
 x-int, doesn't cross: 0

Describe the end behavior of each function.

$$7) f(x) = -x^5 + 2x^3 - x + 1$$

$$\lim_{x \rightarrow -\infty} f(x) = \infty$$

$$\lim_{x \rightarrow \infty} f(x) = -\infty$$

$$9) f(x) = x^4 - 2x^2 - x + 1$$

$$\lim_{x \rightarrow -\infty} f(x) = \infty$$

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$11) f(x) = -x^5 + 3x^3 + 1$$

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$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$10) f(x) = -x^3 - 9x^2 - 24x - 20$$

$$\lim_{x \rightarrow -\infty} f(x) = \infty$$

$$\lim_{x \rightarrow \infty} f(x) = -\infty$$

$$12) f(x) = x^2 + 6x + 6$$

$$\lim_{x \rightarrow -\infty} f(x) = \infty$$

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

Critical thinking questions:

13) Write a polynomial function f with the following properties:

(a) Zeros at 1, 2, and 3

(b) $f(x) \leq 0$ for all values of x

(c) Degree greater than 1

$$f(x) = -(x-1)^2 \cdot (x-2)^2 \cdot (x-3)^2$$

14) Write a polynomial function g with degree greater than one that passes through the points (0, 1), (1, 1), and (2, 1).

$$g(x) = x(x-1)(x-2) + 1$$