

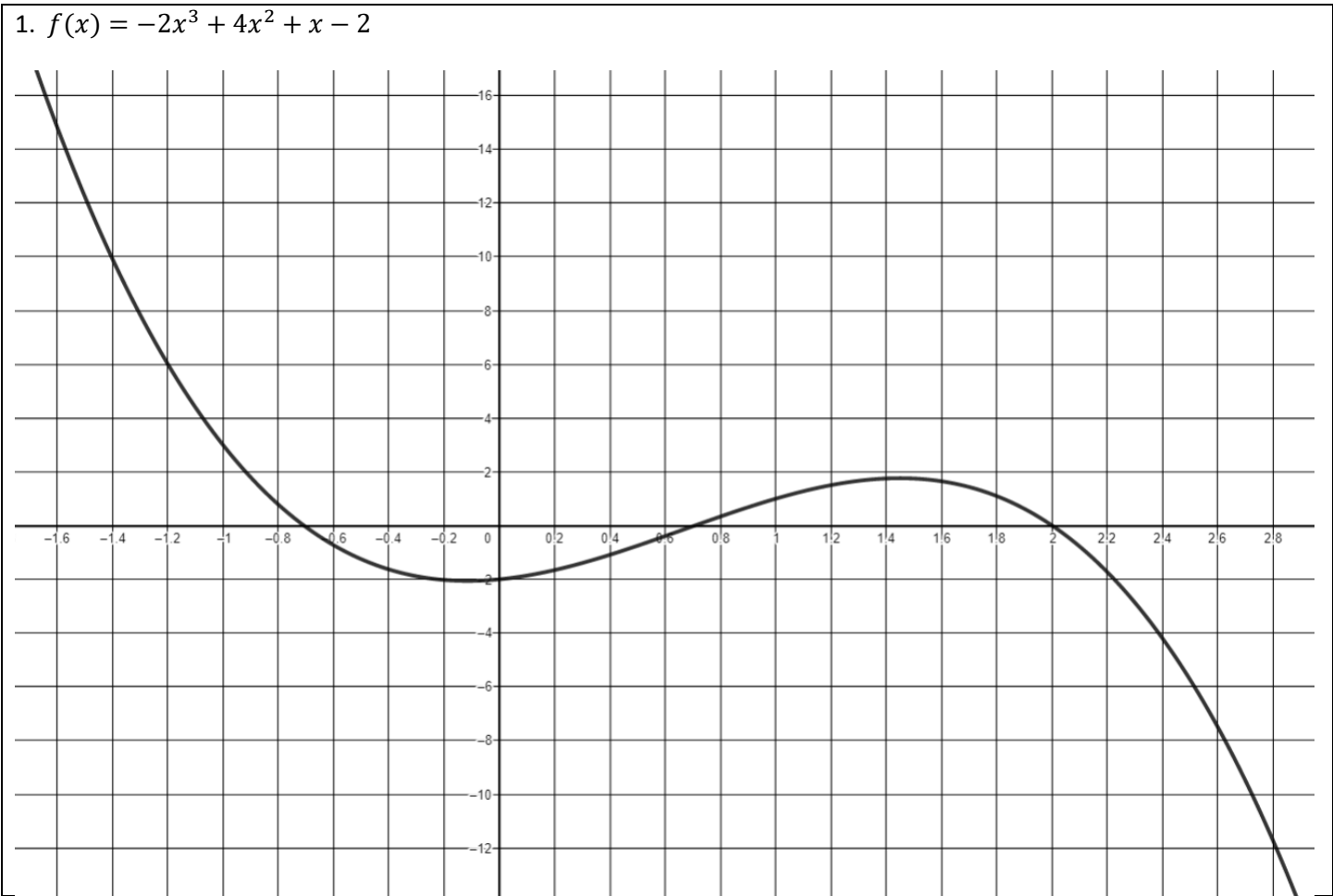
Modules 1 – Relations and Functions

Lesson 2: Linearity, Intercepts, and Symmetry

Lesson 3: Extrema and End Behavior

Lesson 4: Sketching Graphs and Comparing Functions

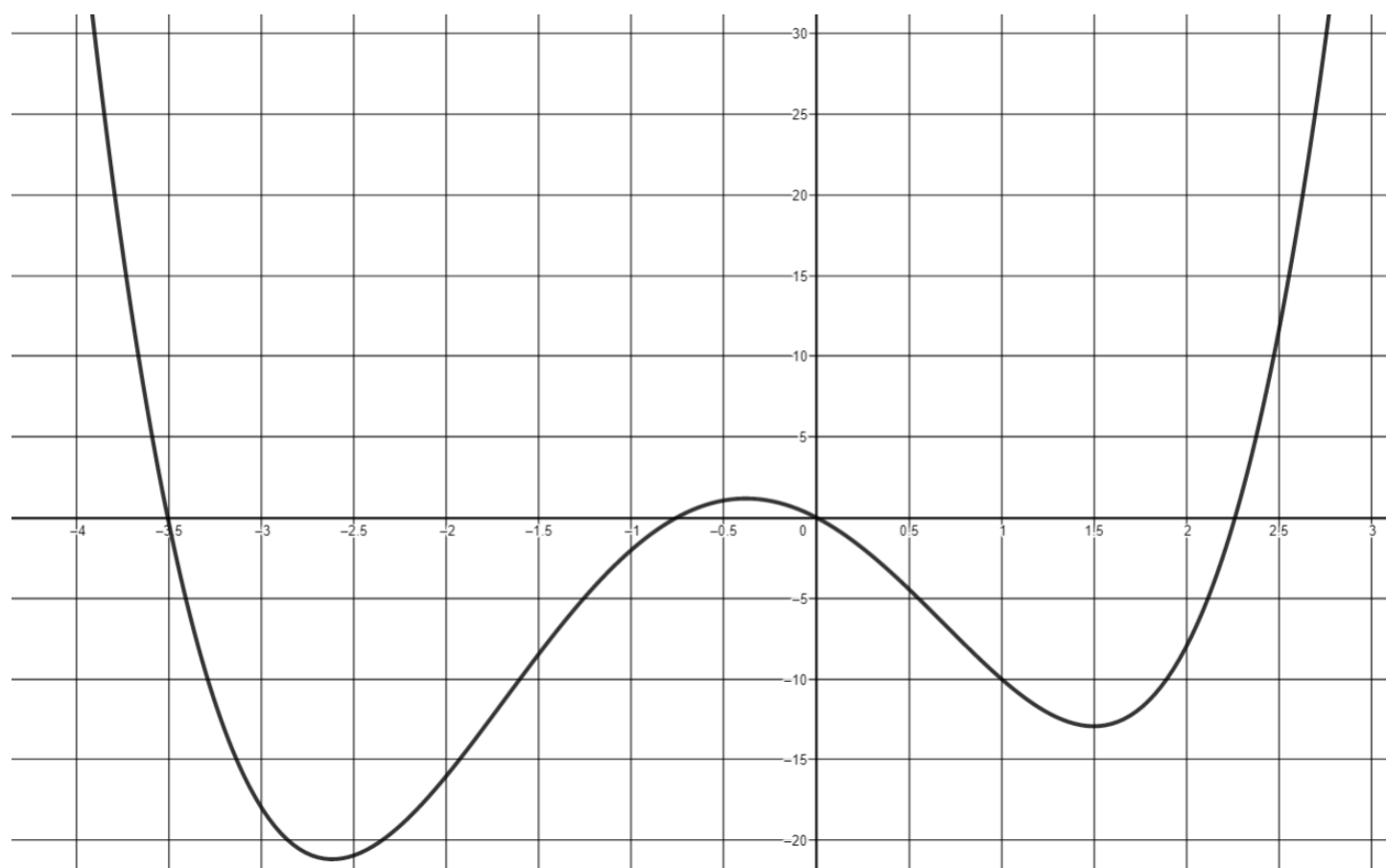
Notes:



Estimate answers to each of the following questions below. Your answers should prove that you understand each concept.			
a. Coordinates of x-intercepts	b. Coordinates of y-intercept	c. Coordinates of Relative (Local) Min/Maxs.	d. End Behavior
e. Interval(s) of increase	f. Interval(s) of decrease	g. Interval(s) of positive function values	h. Interval(s) of negative function values

Symmetry Conversation Notes:

2. $f(x) = x^4 + 2x^3 - 7x^2 - 6x$

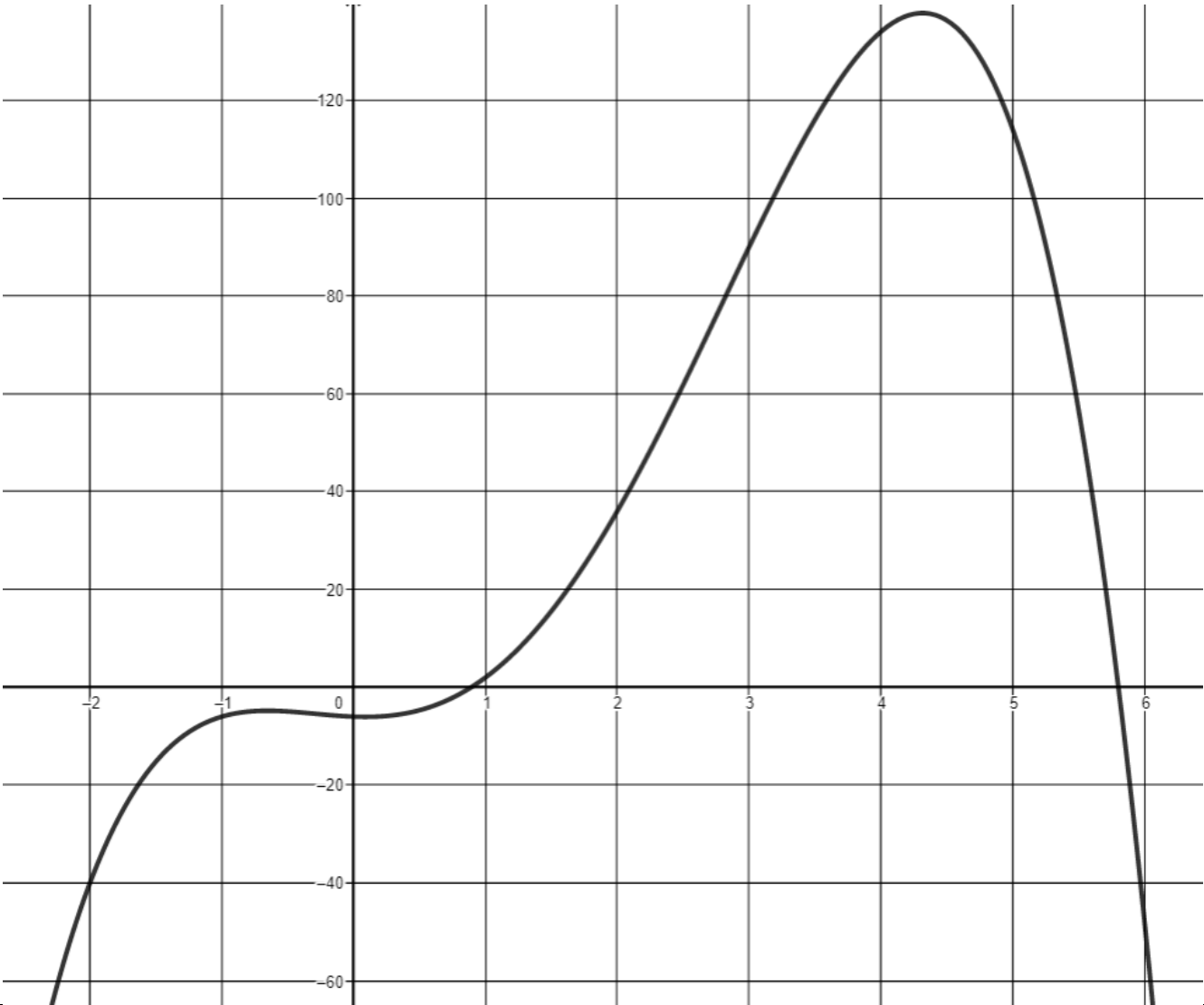


Estimate answers to each of the following questions below. Your answers should prove that you understand each concept.

a. Coordinates of x-intercepts	b. Coordinates of y-intercept	c. Coordinates of Relative (Local) Min/Maxs.	d. End Behavior
e. Interval(s) of increase	f. Interval(s) of decrease	g. Interval(s) of positive function values	h. Interval(s) of negative function values

So far you have been estimating each of the following characteristics of a function. Now, use your estimate knowledge along with your graphing calculator utilities to accurately answer each question to the **nearest hundredth**.

3. $g(x) = -x^4 + 5x^3 + 5x^2 - x - 6$

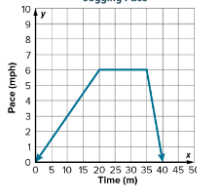


So far you have been estimating each of the following characteristics of a function. Now, use your estimate knowledge along with your graphing calculator utilities to accurately answer each question to the **nearest hundredth**.

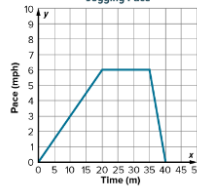
a. Coordinates of x-intercepts	b. Coordinates of y-intercept	c. Coordinates of Relative (Local) Min/Maxs.	d. End Behavior
e. Interval(s) of increase	f. Interval(s) of decrease	g. Interval(s) of positive function values	h. Interval(s) of negative function values

Notes:

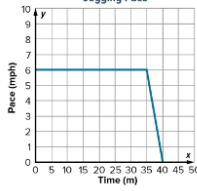
Copied from Module 1:4 Extra Example 3.



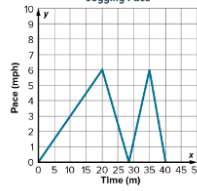
☐ A



☐ B



☐ C



☐ D

Part A
Select the graph that best represents the situation.

Part B
What assumption was made to graph the situation.

☐ A Alicia's pace increases and decreases at a constant rate.

☐ B Alicia's maximum speed is 6 miles per hour.

☐ C There are two x-intercepts.

☐ D Alicia's speed is constant from the 20th to 35th minute.

JOGGING Alicia jogs each morning before school. An app on her phone records her pace over the course of her 40-minute jog. Use the key features of her jog to determine which graph could model it.

y-Intercept: Alicia's starting pace is 0 miles per hour.
Extrema: Alicia's fastest pace, 6 miles per hour, occurs from the 20th to 35th minute of her jog.
Increasing: Alicia's pace is increasing from 0 to 20 minutes.
Decreasing: Alicia's pace is decreasing from 35 to 40 minutes.
End Behavior: Alicia starts jogging at 0 minutes and stops at 40 minutes.

Notes:

Copied from Module 1:4 Extra Example 4.

Use the table and description to compare the two functions.

x	$f(x)$
-4	0
-2	-1.5
0	-3
2	-4.5
4	-6

The graph of $g(x)$ has a slope of -4 and passes through the points $(0, -3)$ and $(-\frac{3}{4}, 0)$.

Which statements about $f(x)$ and $g(x)$ are true? Select all that apply.

☐ A Both functions are decreasing.

☐ B The y-intercept of $f(x)$ is greater than the y-intercept of $g(x)$.

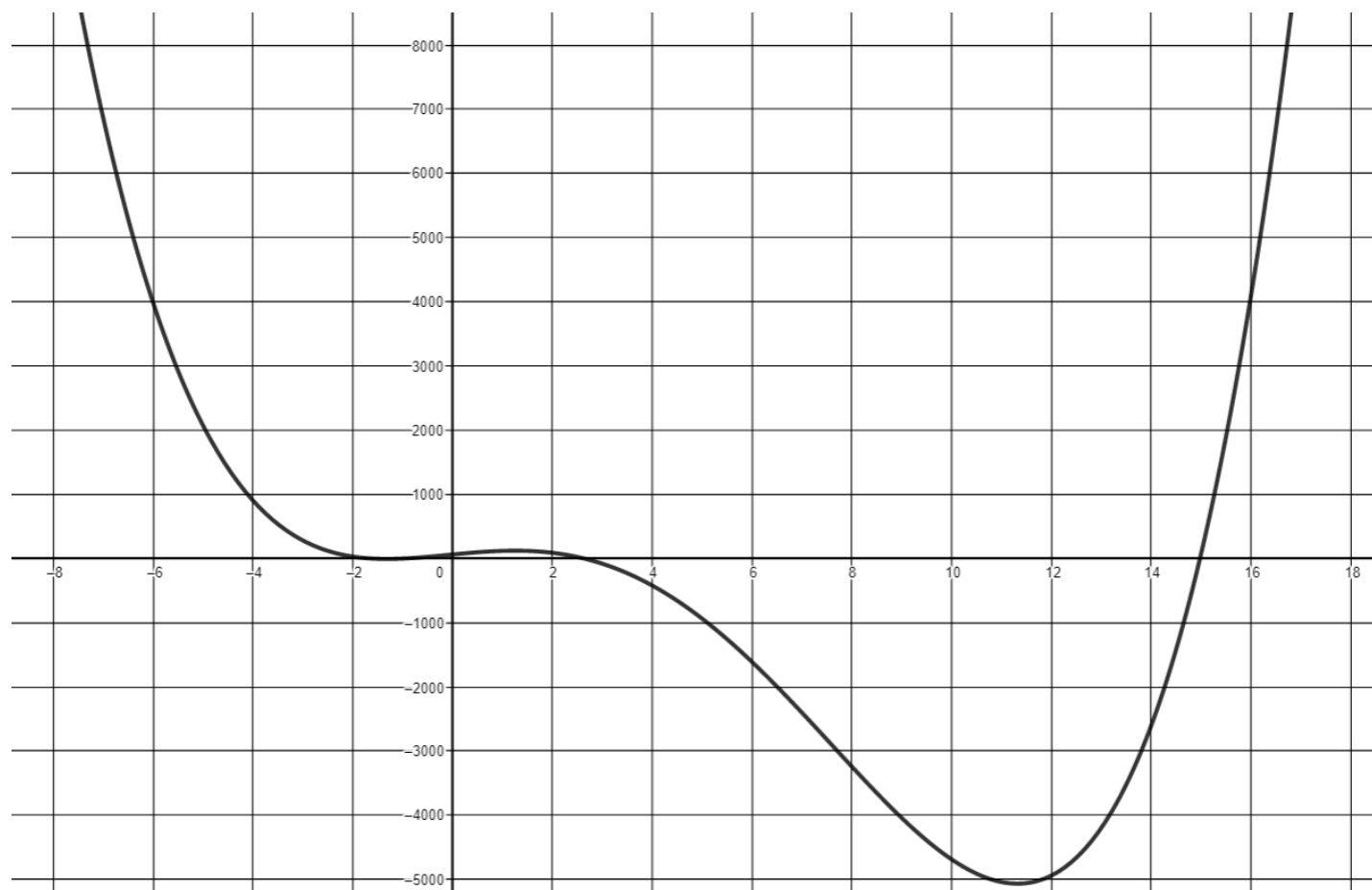
☐ C $g(x)$ decreases faster than $f(x)$.

☐ D Both functions have the same y-intercept.

☐ E The x-intercept of $f(x)$ is greater than the x-intercept of $g(x)$.

☐ F $f(x)$ decreases faster than $g(x)$.

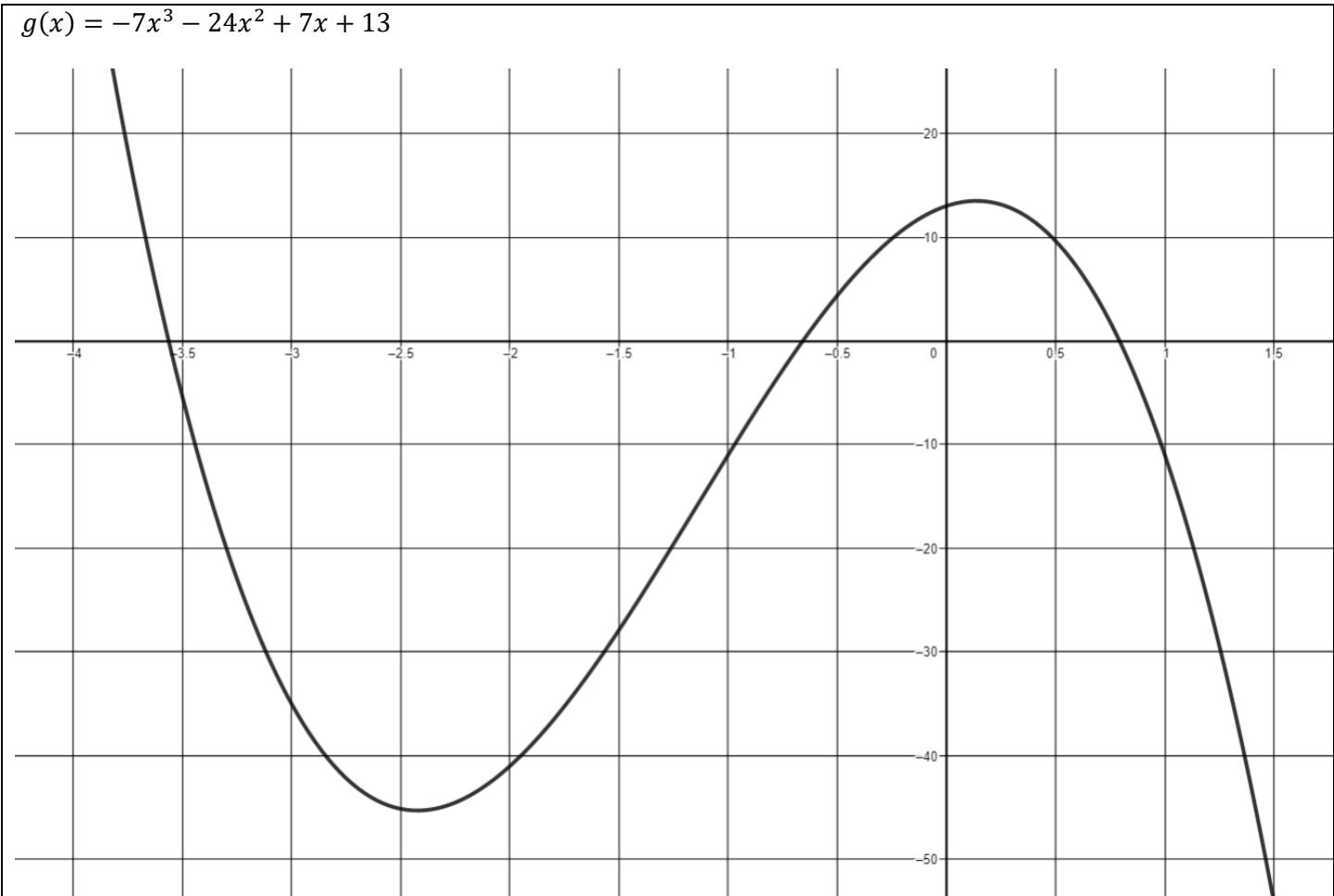
4. $f(x) = x^4 - 15x^3 - 5x^2 + 75x + 63$



So far you have been estimating each of the following characteristics of a function. Now, use your estimate knowledge along with your graphing calculator utilities to accurately answer each question to the **nearest hundredth**.

a. Coordinates of x-intercepts	b. Coordinates of y-intercept	c. Coordinates of Relative (Local) Min/Maxs.	d. End Behavior
e. Interval(s) of increase	f. Interval(s) of decrease	g. Interval(s) of positive function values	h. Interval(s) of negative function values

Answer each of the following questions below. Your answers must be accurate to 2 decimal places. You can estimate these answers, but you will not receive full credit due to a lack of accuracy.



1. (5 pts.) a. Coordinates of x-intercepts b. Coordinates of y-intercept	2. (4 pts.) a. Interval(s) of positive function values b. Interval(s) of negative function values	3. (4 pts.) What WINDOW Settings would you use to match the screen shown above? WINDOW Xmin= Xmax= Xscl= Ymin= Ymax= Yscl=
4. (5 pts.) Coordinates of Relative (Local) Min/Maxs.	5. (4 pts.) a. Interval(s) of increase b. Interval(s) of decrease	6. (3 pts.) End Behavior

Lesson 5: Graphing Linear Functions
Lesson 6: Special Functions

Evaluating Piecewise Functions
Given:

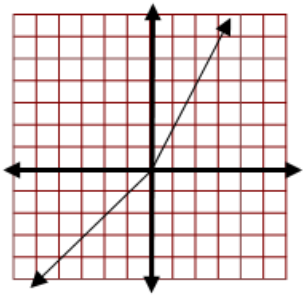
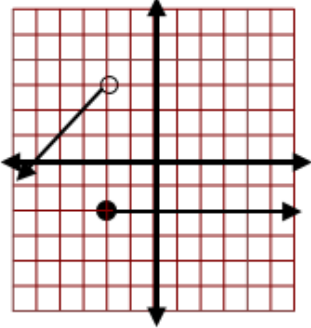
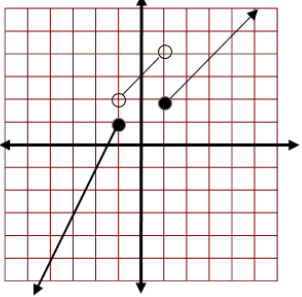
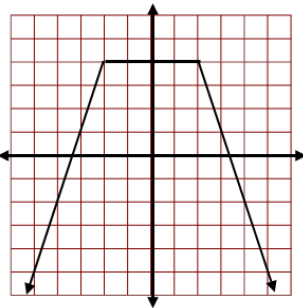
$f(x) = \begin{cases} x + 1 & \text{if } -5 \leq x < 5 \\ 2x - 4 & \text{if } 5 \leq x < 10 \end{cases}$	$g(x) = \begin{cases} 5 & \text{if } -4 \leq x < 1 \\ 2x & \text{if } 1 \leq x \leq 3 \\ -\frac{1}{3}x + 1 & \text{if } x > 3 \end{cases}$	$h(x) = \begin{cases} 3 - x & \text{if } -8 < x < -3 \\ 9 & \text{if } -3 \leq x < 1 \\ x^2 + 3 & \text{if } 1 \leq x \leq 2 \\ -3 & \text{if } x > 2 \end{cases}$
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Evaluate each function.

1. $f(6) =$	2. $h(-5) =$	3. $g(0) =$	4. $f(-4) =$
5. $h(2)$	6. $h(-2)$	7. $f(5)$	8. $g(3)$
9. $g(1)$	10. $f(g(9))$	11. $h(f(3))$	12. $g(f(h(2)))$

Notes:

Identify the Domain and Range of each function. Assume that the units are 1.

13. Domain: _____ Range: _____ 	14. Domain: _____ Range: _____ 	15. Domain: _____ Range: _____ 	16. Domain: _____ Range: _____ 
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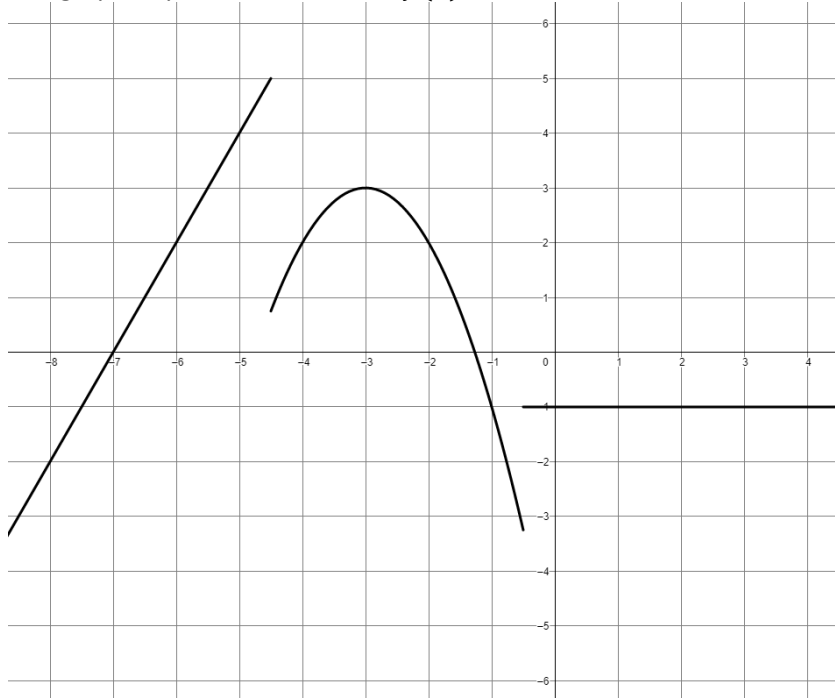
Graph each piecewise function. Identify the Domain and Range of each function. Use your own graph paper for this portion.

17. $f(x) = \begin{cases} x + 1 & \text{if } 0 \leq x < 5 \\ 2x - 4 & \text{if } 5 \leq x < 10 \end{cases}$ Domain: _____ Range: _____	18. $f(x) = \begin{cases} 3x - 4 & \text{if } 0 \leq x < 6 \\ 20 - x & \text{if } 6 \leq x < 12 \end{cases}$ Domain: _____ Range: _____	19. $f(x) = \begin{cases} 20 & \text{if } 0 \leq x < 10 \\ \frac{x}{2} + 15 & \text{if } 10 \leq x < 20 \end{cases}$ Domain: _____ Range: _____
20. $f(x) = \begin{cases} 4x & \text{if } 0 \leq x < 2 \\ -2x + 10 & \text{if } 2 \leq x < 5 \\ 2 & \text{if } 5 \leq x < 10 \end{cases}$ Domain: _____ Range: _____	21. $f(x) = \begin{cases} -2 & \text{if } x < 0 \\ x + 1 & \text{if } 0 \leq x \leq 10 \\ -\frac{1}{2}x + 16 & \text{if } x > 10 \end{cases}$ Domain: _____ Range: _____	22. $f(x) = \begin{cases} 2 & \text{if } x < 1 \\ 2x & \text{if } 1 \leq x \leq 3 \\ 7 - \frac{1}{3}x & \text{if } x > 3 \end{cases}$ Domain: _____ Range: _____
23. $h(x) = \begin{cases} 3 - x & \text{if } -8 < x < -3 \\ 9 & \text{if } -3 \leq x < 1 \\ x^2 + 3 & \text{if } 1 \leq x \leq 2 \\ -3 & \text{if } x > 2 \end{cases}$ Domain: _____ Range: _____		24. $f(x) = \begin{cases} 5 - x & \text{if } x < 2 \\ x - 1 & \text{if } 2 \leq x \leq 10 \end{cases}$ Domain: _____ Range: _____

Evaluating Piecewise Functions given a graph.

Reminder - When graphing a function, what are you showing?

The graph of piecewise function, $f(x)$, is shown below.



Evaluate each using the graph.

13. $f(1) =$

14. $f(-8) =$

15. $f(-3) =$

16. $f(3) =$

17. $f(-1) =$

18. $f(-5) =$

