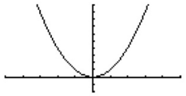
END BEHAVIOR

$f(x) = x^2$



Degree: Even

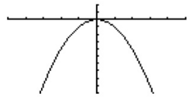
Leading Coefficient: +

End Behavior: Up Up ↖ ↗

$y \to \infty \text{ as } x \to -\infty, y \to \infty \text{ as } x \to \infty$

END BEHAVIOR

$f(x) = -x^2$



Degree: Even

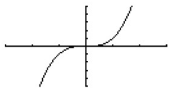
Leading Coefficient: −

End Behavior: Down Down ↙ ↘

$y \to -\infty \text{ as } x \to -\infty, y \to -\infty \text{ as } x \to \infty$

END BEHAVIOR

$f(x) = x^3$



Degree: Odd

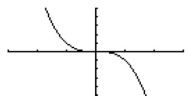
Leading Coefficient: +

End Behavior: Down Up ↙ ↗

$y \to -\infty \text{ as } x \to -\infty, y \to \infty \text{ as } x \to \infty$

END BEHAVIOR

$f(x) = -x^3$



Degree: Odd

Leading Coefficient: −

End Behavior: Up Down ↖ ↘

$y \to \infty \text{ as } x \to -\infty, y \to -\infty \text{ as } x \to \infty$

Describe the end behavior of each polynomial.

1. $y = -8x^5 + 24x^3 - 11x^2 + 104$

2. $f(x) = -7x^2(6 - x)^2(x - 5)^3(2x+3)$

---

1. $y = -8x^5 + 24x^3 - 11x^2 + 104$

this is a negative odd polynomial, therefore, its end behavior will mimic that of a line with a negative slope.

Up Down

↖ ↘

as $x \to -\infty$, $y \to +\infty$
as $x \to +\infty$, $y \to -\infty$

2. $f(x) = -7x^2(6 - x)^2(x - 5)^3(2x+3)$
$-$ $(-)^2$ $(+)^3$ $(+)$

degree = 2+2+3+1 = 8 Even

leading coefficient = (-)(+)(+)(+) = -

this is a negative even polynomial, therefore, its end behavior will mimic that of a parabola that opens down.

Down Down

↙ ↘

as $x \to \pm\infty$, $y \to -\infty$

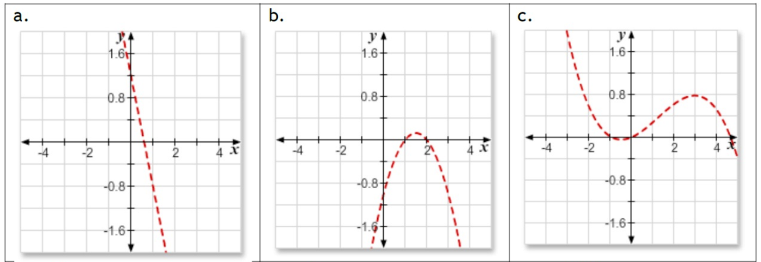
Topic 5: Analyzing Polynomial Functions

Overview page 1

Topic 5: SAS1 question 1

---

1. For each graph, what must be true about the values of the coefficients in the polynomial form to create the graph? **[OV, page 1]**



a.	b.	c.
$a_3 = 0$	$a_3 = 0$	$a_3 = -0.04$
$a_2 = 0$	$a_2 = -0.5$	$a_2 = 0.15$
$a_1 = -2$	$a_1 = 1.5$	$a_1 = 0.17$
$a_0 = 1.2$	$a_0 = -1$	$a_0 = 0$

Topic 5: Analyzing Polynomial Functions

Overview page 2

Topic 5: Analyzing Polynomial Functions

Exploring "Concavity" page 1

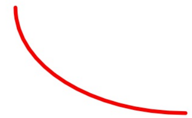
Topic 5: Analyzing Polynomial Functions

Exploring "Concavity" page 2

A part of a polynomial on a certain interval is described as being concave up.

What do you think this could look like?

example:



Topic 5: Analyzing Polynomial Functions

Exploring "Concavity" page 3

Topic 5: SAS2 question 2

Topic 5: Analyzing Polynomial Functions

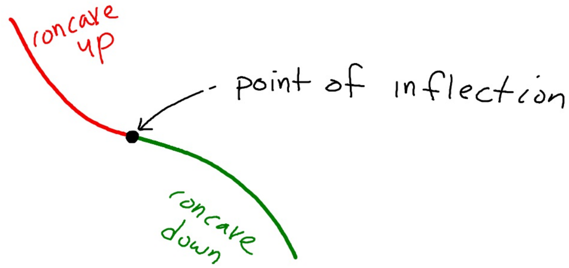
Exploring "Concavity" pages 4 & 5

Interval Notation

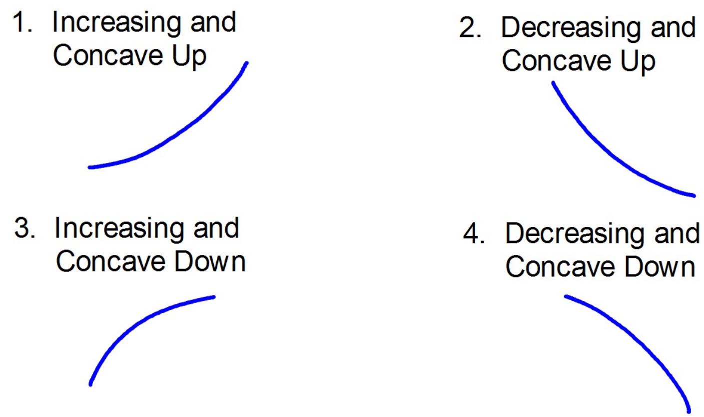
Topic 5: SAS2 question 3

2. Define, in words and using a graph, the term ***inflection point***.

where a graph changes concavity.



Sketch part of a polynomial that fits each description:



Topic 5: Analyzing Polynomial Functions

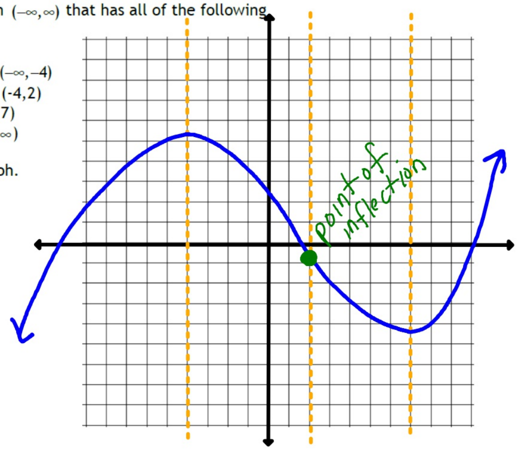
Exploring "Concavity" page 8

Topic 5: SAS2 question 5

5. Sketch the graph of a single function with domain $(-\infty,\infty)$ that has all of the following characteristics:

- Concave down and increasing on the interval $(-\infty,-4)$
- Concave down and decreasing on the interval (-4,2)
- Concave up and decreasing on the interval (2,7)
- Concave up and increasing on the interval $(7,\infty)$

Label the inflection point on your completed graph.



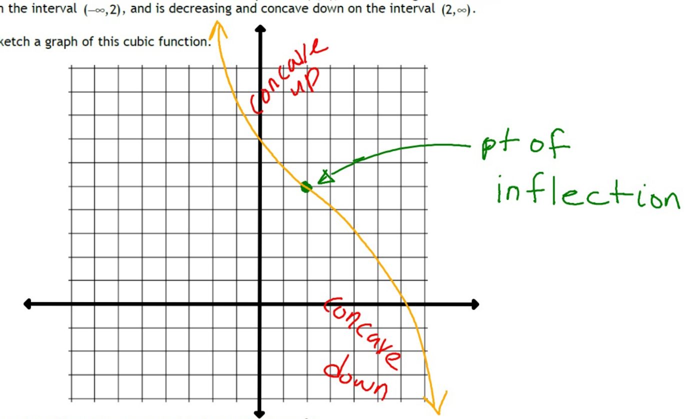
Topic 5: Analyzing Polynomial Functions

Exploring "Concavity" page 10

Topic 5: SAS2 question 7 a,b

7. Consider a cubic function that has an inflection point at (2,5), is decreasing and concave up on the interval $(-\infty,2)$, and is decreasing and concave down on the interval $(2,\infty)$.

a. Sketch a graph of this cubic function.



b. How does this graph compare with the graph of $y = x^3$?

Hwk #23:

- Topic 5 - SAS2 Problem #8 a,b,c

  AND

- Agilemind website - Topic 4
  More Practice 1 & 3