Bellwork

Find the vertex, y-intercept, and x-intercepts of the function. Does the graph open up or down?

\[ y = x^2 - 4x - 5 \]

- **Vertex:** \( (2, -9) \)
- **X-intercepts:** \( x = -1, x = 5 \)
- **Y-intercept:** \(-5\)
- **Opens up:** \(a\) is positive

\[ a = 1, b = -4, c = -5 \]
Homework Answers

1) \[ x^3 - 7x + 6 = 0 \]

2) \[ x^4 + x^3 - 10x^2 + 8x = 0 \]

3) \[ x^5 - 5x^3 + 4x = 0 \]

4) \[ x^3 - 2x^2 - 3x + 6 = 0 \]

5) \[ x^4 - 3x^2 + 2 = 0 \]

6) \[ \pm 4i \]

\[ (x + 4i)(x - 4i) \]

\[ x^2 - 16i^2 \]

\[ x^2 + 16 \]

6) \[ x^2 + 4 = 0 \]

7) \[ x^3 - 2x^2 + 25x - 50 = 0 \]
Homework Answers

1) \[ y = (x - 4)^2 - 4 \]
   Vertex(4, -4)
   y-intercept (0,12)
   x-intercept (2,0) (6,0)
   opens up

2) \[ y = -(x + 5)^2 + 7 \]
   Vertex(-5, 7)
   y-intercept (0,-18)
   x-intercept (-2.35,0) (-7.65,0)
   opens down
Day 3 – Properties of Polynomials

Objective - List the characteristics of the polynomial function by examining the equation

- clever
- honest
- talkative
- ambitious
- imaginative
- charming
- affectionate
- loyal
- generous
- sporting
- honest
- helpful
Define “standard form”

\[ x^4 + 4 - 4x^2 \]

\[ -4x^2 + x + 4 \]

\[ 10 + x^2 + 9x^4 + 2x + 7x^2 - x^3 \]

\[ 9x^4 - x^3 + 8x^2 + 2x + 10 \]
Recall....

What is **degree** of a polynomial??

- no variable (0 degree) – \( x^0 \) Constant
- 1\(^{st}\) degree - \( x^1 \) Linear
- 2\(^{nd}\) degree - \( x^2 \) Quadratic
- 3\(^{rd}\) degree – \( x^3 \) Cubic
- 4\(^{th}\) degree – \( x^4 \) Quartic
- 5\(^{th}\) degree - \( x^5 \) Quintic
Name all of the characteristics you can about the following polynomial functions.

\[7x^3 - 5x + 6x^2 - 1\]  \[2x^4 - 5x^5 + 9x + 4\]

- **Standard Form**: \(7x^3 + 6x^2 - 5x - 1\)  \(-5x^5 + 2x^4 + 9x + 4\)
- **Degree**: 3  5
- **Type of Function**: cubic  quintic
- **# of Solutions**: 3  5
- **# of Turns**: 2  4
- **y-intercept**: -1  4
- **Leading Coefficient**: 7  -5
- **Left End Behavior**: -\(\infty\)  -8
- **Right End Behavior**: \(-\infty\)  -8
Question...

What is a relative maximum?
  high point but not highest

What is a relative minimum?
**The maximum number of turning points a graph will make is the degree minus 1.**

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Leading Coefficient: **POSITIVE**

Leading Coefficient: **NEGATIVE**

Leading Coefficient: **POSITIVE**

Leading Coefficient: **NEGATIVE**
Determine whether the graph is:
- Odd or even degree
- Positive or negative leading coefficient
- How many real zeros
Possible Degree

Do these graphs have a maximum or minimum? Both? Neither? Why?
How do you determine a polynomial’s end behavior?
Homework

Classifying polynomials worksheet

Complete the following and hand in:

Worksheet # 1
Sage and Scribe Worksheet
4 graphing problems (from Monday)
Homework from last class. (see handout)