

GPS Calculus

Name: \_\_\_\_\_

Graphs and Characteristics of Polynomials

**\*\*Graph Scales GIVEN\*\***

Characteristics of Polynomials - Describe all the characteristics of each polynomial.

Sketch each of the graphs

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

- Domain: \_\_\_\_\_

Range: \_\_\_\_\_

Zeros: \_\_\_\_\_

x-int: \_\_\_\_\_

y-int: \_\_\_\_\_

end behavior: \_\_\_\_\_

Maximums: global: \_\_\_\_\_

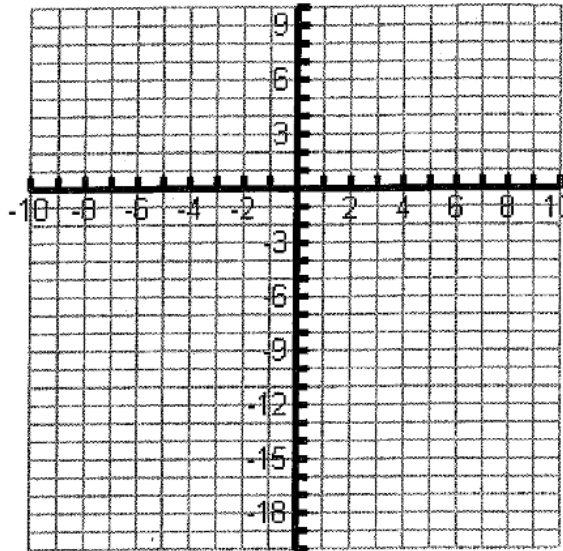
Local: \_\_\_\_\_

Minimums: global: \_\_\_\_\_

Local: \_\_\_\_\_

Intervals: increasing: \_\_\_\_\_

decreasing: \_\_\_\_\_



$$f(x) = x^4 - 13x^2 + 40 = (x^2 - 8)(x^2 - 5)$$

- Domain:  $\mathbb{R}$

Range:  $[-2.25, \infty)$

Zeros:  $\pm 2\sqrt{2}, \pm \sqrt{5} \approx 2.24$

x-int:  $(\sqrt{5}, 0), (-\sqrt{5}, 0), (2\sqrt{2}, 0), (-2\sqrt{2}, 0)$

y-int:  $(0, 40)$

end behavior:  $x \rightarrow +\infty, y \rightarrow \infty$ ;  $x \rightarrow -\infty, y \rightarrow \infty$

Maximums: global: None

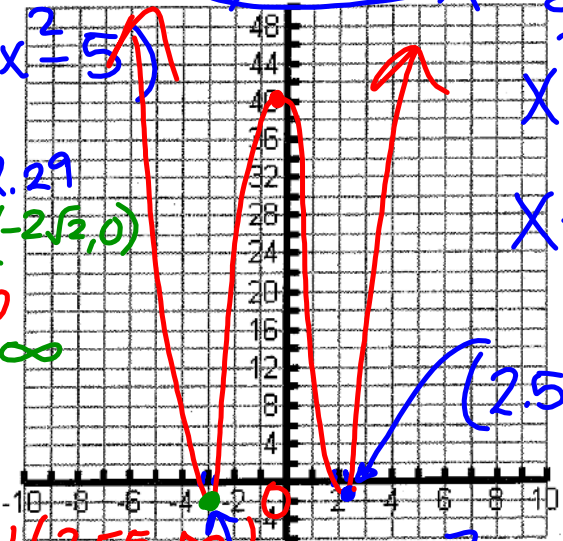
Local:  $y = 40$

Minimums: global:  $y = -2.25$

Local: same

Intervals: increasing:  $(-2.55, 0) \cup (2.55, \infty)$

decreasing:  $(-\infty, -2.55) \cup (0, 2.55)$



$y \geq -2.25$

$x^2 = 5$

$x = \pm\sqrt{5}$

$\infty$

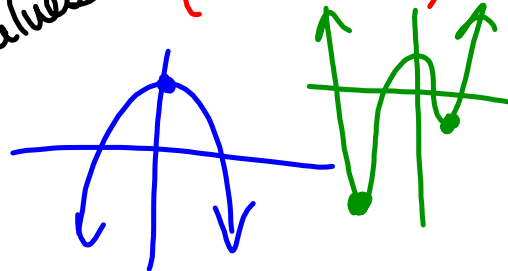
$(2.55, -2.25)$

$x^2 - 8 = 0$

$x^2 = 8$

$x = \pm\sqrt{8}$

x values



$(-2.55, -2.25)$

$$(4x-1)(x+1)(x-1) = 0$$

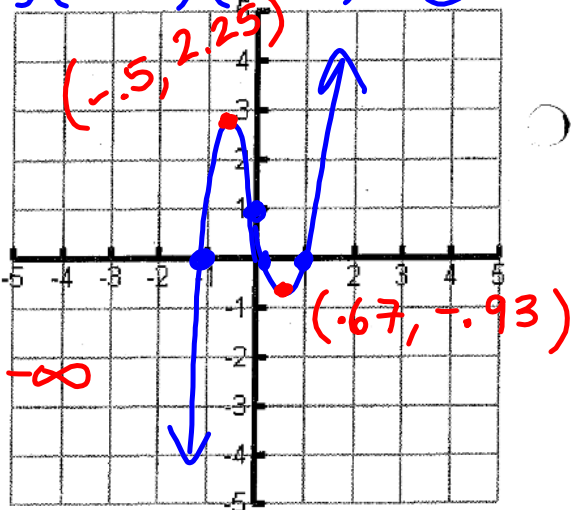
$$f(x) = 4x^3 - x^2 - 4x + 1$$

3. Domain:  $\mathbb{R}$   
 Range:  $\mathbb{R}$   
 Zeros:  $\pm 1, +1/4$   
 x-int:  $(1,0), (-1,0), (1/4,0)$   
 y-int:  $(0,1)$

end behavior:  
 $x \rightarrow +\infty, y \rightarrow +\infty$  /  $x \rightarrow -\infty, y \rightarrow -\infty$

- Maximums: global: none  
 Local:  $y = 2.25$   
 Minimums: global: none  
 Local:  $y = -.93$

- Intervals: increasing:  $(-\infty, -0.5) \cup (-0.67, \infty)$   
 decreasing:  $(-0.5, -0.67)$



$$(5x+4)(x+5)$$

$$f(x) = 5x^2 + 29x + 20$$

- Domain:  $\mathbb{R}$   
 4. Range:  $[-22.05, \infty)$   
 Zeros:  $-5, -4/5$   
 x-int:  $(-5,0), (-4/5,0)$   
 y-int:  $(0,20)$   
 end behavior:

$x \rightarrow +\infty, y \rightarrow \infty$  /  $x \rightarrow -\infty, y \rightarrow \infty$

- Maximums: global: none  
 Local: none  
 Minimums: global:  $y = -22.05$   
 Local: same

- Intervals: increasing:  $(-2.90, \infty)$   
 decreasing:  $(-\infty, -2.90)$

