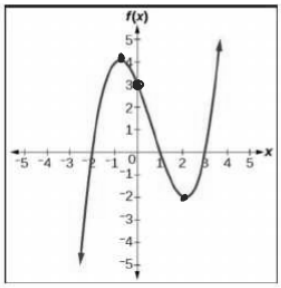
Consider the graph of the polynomial function.



What is the possible smallest degree for this polynomial function? Explain your reasoning.

Degree = 3

2 turning pts 3 x-intercepts

Estimate the coordinates of local extrema.

Local max (-1, 4) Local min (2, -2)

Estimate the zeros of the function.

$x = -2, 1, 3$

Create a rule for this polynomial. Write the the points used to create the rule.

$(-2,0)(1,0)(3,0)(0,3)$ $y = \frac{1}{2}x^3 - x^2 - \frac{5}{2}x + 3$

Give the intervals of increasing and decreasing.

Inc: $(-\infty, -1)$, $(2, \infty)$ Dec: $(-1, 2)$

Consider the function $g(x) = (x^2 - 2x)(x - 6)$

$x(x-2)(x-6)$

What are the zeros?

$x = 0, 2, 6$

Write the function in standard form. $x^3 - 6x^2 - 2x^2 + 12x$

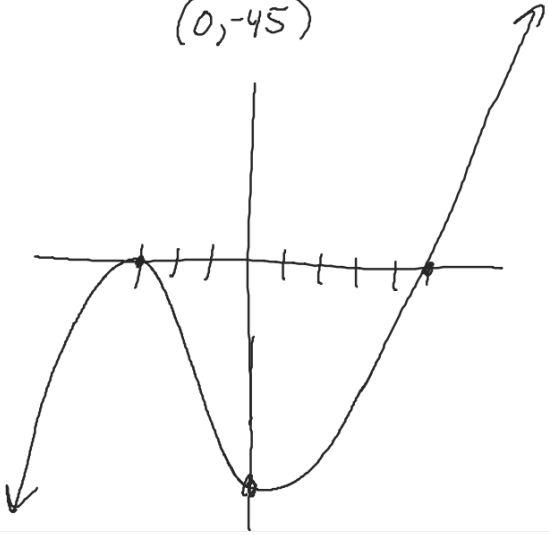
$g(x) = x^3 - 8x^2 + 12x$

What are the end behaviors g(x)? $\lim_{x \to \infty} g(x) = \infty$ $\lim_{x \to -\infty} g(x) = -\infty$

Write a cubic function that has zeros of (-3, 0) and (5,0). Find the y-intercept and sketch a graph.

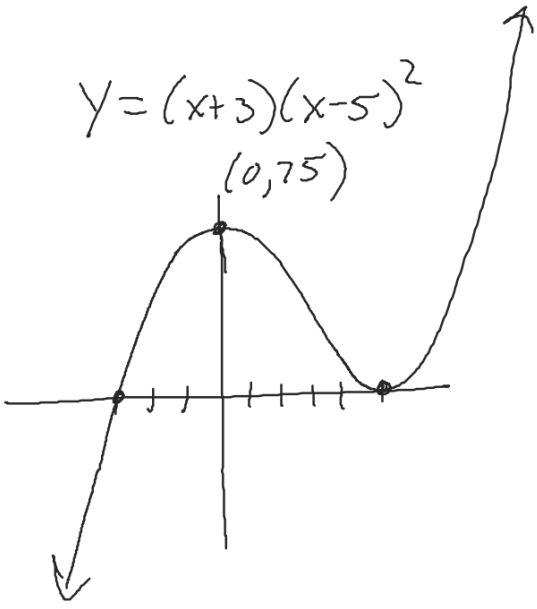
$y = (x+3)^2(x-5)$

$(0,-45)$



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

$(0,75)$



Preform the indicated operation. Make sure your answer is in standard form.

$(-4x + 4x^3 + 7) + (3x^3 - 9 - 3x)$

$7x^3 - 7x - 2$

$(-2x^3 + x) - (7x - 3 - 7x^3)$

$-2x^3 + x - 7x + 3 + 7x^3$

$5x^3 - 6x + 3$

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

$x^4 - 6x^3 + 5x^2$

$3x^3 - 18x^2 + 15x$

$-4x^2 + 24x - 20$

$x^4 - 3x^3 - 17x^2 + 39x - 20$

Using long division to see if $3x - 2$ is a factor of $9x^3 - x + 3$.

$$
\begin{array}{r}
3x^2 + 2x + 1 \\
3x-2 \overline{)\,9x^3 + 0x^2 - x + 3} \\
(-)\ 9x^3 - 6x^2 \\
\hline
6x^2 - x \\
(-)\ 6x^2 - 4x \\
\hline
3x + 3 \\
(-)\ 3x - 2 \\
\hline
5
\end{array}
$$

$3x-2$ is not a factor

Use synthetic division to divide f(x) by d(x).

$f(x) = 3x^3 - 2x^2 + 3x - 6$ $\qquad$ $d(x) = x + 1$

$$\begin{array}{r|cccc} -1 & 3 & -2 & 3 & -6 \\ & & -3 & 5 & -8 \\ \hline & 3 & -5 & 8 & -14 \end{array}$$

$$3x^2 - 5x + 8 - \frac{14}{x+1}$$

Write each as a product of linear factors. Then solve each function.

$f(x) = 2x^2 + 7x + 5$

$\frac{10}{2 \cdot 5}$

$0 = 2x^2 + 7x + 5$

$(2x^2 + 2x) + (5x + 5)$

$2x(x+1) + 5(x+1)$

$(2x+5)(x+1)$

$2x+5=0 \quad x+1=0$

$x = -\frac{5}{2} \quad x = -1$

$g(x) = 4x^2 - 7x + 3$

$0 = 4x^2 - 7x + 3$

$0 = (4x - 3)(x - 1)$

$4x - 3 = 0 \quad x - 1 = 0$

$x = \frac{3}{4} \quad x = 1$

Give the degree of the polynomial. Give the zeros, the multiplicity of each zero, and whether the graph crosses the x-axis or touches at the corresponding zero.

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

Degree 7

Zeros	mult	
$x=3$	2	touch
-2	3	Cross
5	2	touch

$y = x^2(2x-3)^2(x+3)^3$