

### Function Analysis with Polynomials

Analyze the end behavior of the following functions using limit notation.

1.  $f(x) = x^5 - 3x^2 + 4x - 5$

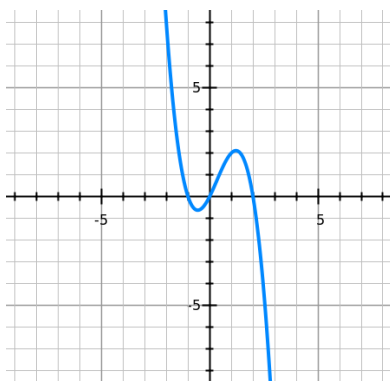
2.  $f(x) = 2x^4 - 3x^3 + 2x^2 - x + 1$

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

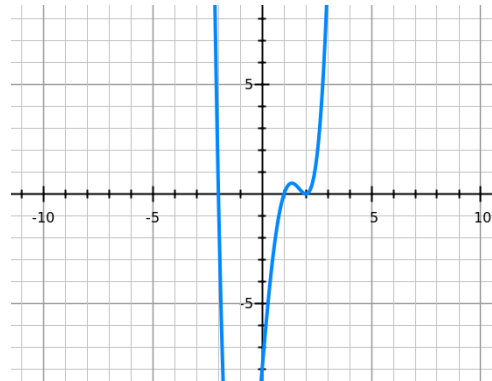
4.  $f(x) = -x^4 - 5x^2 + 5x - 7$

Given the following graphs name the degree and sign of leading coefficient. Then find the zeros and multiplicity of each zero.

5.



6.



Graph the following functions, then analyze including end behavior using limits.

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

Domain:

Max:

Range:

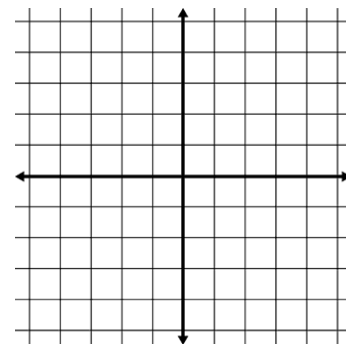
Min:

Increasing:

End Behavior:

Decreasing:

Symmetry:



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

Domain:

Max:

Range:

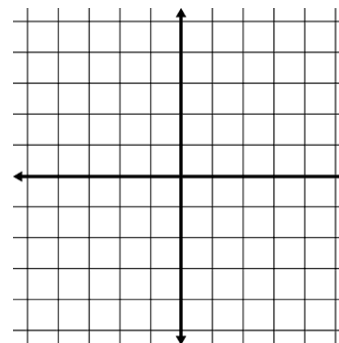
Min:

Increasing:

End Behavior:

Decreasing:

Symmetry:



9.  $f(x) = x^2(x+5)^3(x+1)^2$

Domain:

Max:

Range:

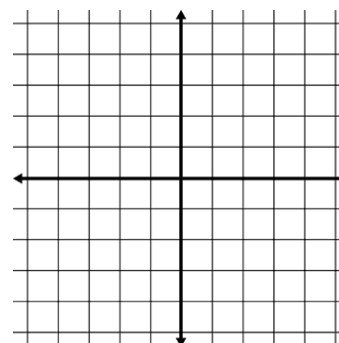
Min:

Increasing:

End Behavior:

Decreasing:

Symmetry:



## Review

Divide the following polynomials using long division or synthetic division

1.  $x^4 - 2x^3 + 3x^2 - 4x + 6 \div x^2 + 2x - 1$

2.  $9x^3 + 7x^2 - 3x \div x - 10$

**Selected Answers:**

1.  $\lim_{x \rightarrow -\infty} f(x) = -\infty, \lim_{x \rightarrow \infty} f(x) = \infty$

4.  $\lim_{x \rightarrow -\infty} f(x) = -\infty, \lim_{x \rightarrow \infty} f(x) = -\infty$

5. Degree: 3

Leading Coefficient (-)

Zeros:

-1 multiplicity 1

0 multiplicity 1

2 multiplicity 1

7. Domain:  $(-\infty, \infty)$ Range:  $(-\infty, \infty)$ Increasing:  $(-\infty, -0.2) \cup (1, \infty)$ Decreasing:  $(-0.2, 1)$ 

Symmetry: NA

Max: NA Local max at  $(-0.2, 8.4)$ 

Min: NA

End Behavior:

$$\lim_{x \rightarrow -\infty} f(x) = -\infty, \lim_{x \rightarrow \infty} f(x) = \infty$$