

Key Words:
Polynomial
Degree
Leading Coefficient
Constant
Multiplicity
Turning Point
End behavior / Limits

A **POLYNOMIAL** is a function of the form:

$$f(x) =$$

where n represents a non-negative integer

Example:

Degree - _____ **Power Function: $f(x) =$** _____

Leading Coefficient - _____

Constant – _____

Your turn...

1. Determine which of the following are polynomial functions. If yes, state the degree and leading coefficient. If not, explain why it is not a polynomial function.

a) $f(x) = x^4 - 8x^{-2} + 9x - 12$ Yes or No

 Degree _____ Leading Coefficient _____ or Explain

b) $g(x) = 5x^{12} + 10x^8 - 1$ Yes No

 Degree _____ Leading Coefficient _____ or Explain

c) $h(x) = -18x^2 - 4x^3 + 12 - 5x^6$ Yes No

 Degree _____ Leading Coefficient _____ or Explain

d) $k(x) = 13\sqrt{x}$ Yes No

 Degree _____ Leading Coefficient _____ or Explain

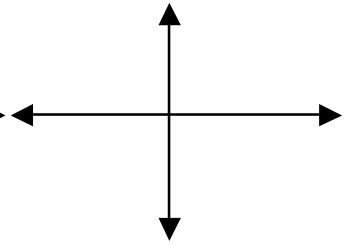
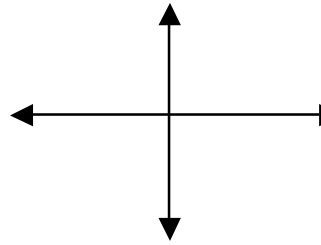
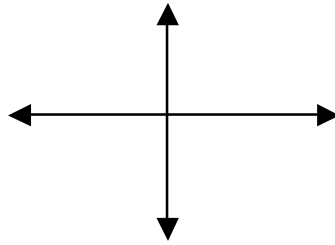
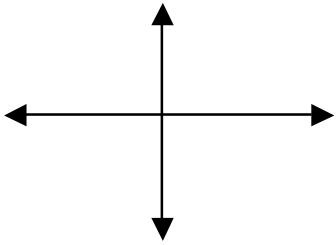
End behavior:

Even positive

Even negative

Odd positive

Odd negative



$$\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$$

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Turning point:

Multiplicity:

Your turn...

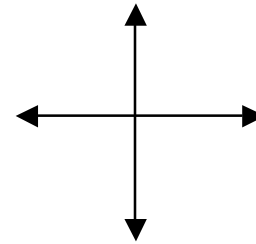
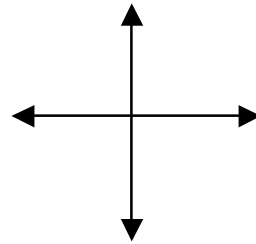
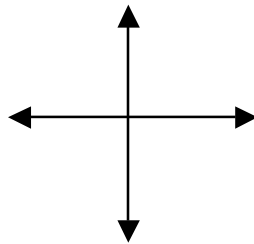
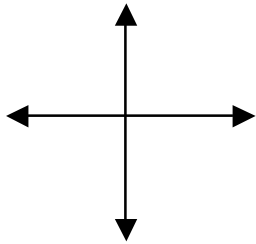
Sketch a graph of:

a) $f(x) = x - 3$

b) $f(x) = (x - 3)^2$

c) $f(x) = (x - 3)^3$

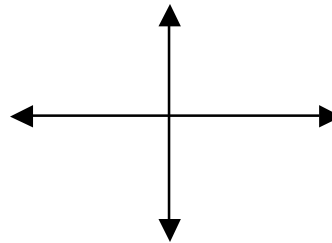
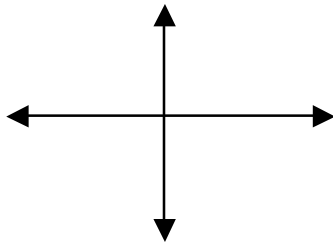
d) $f(x) = (x - 3)^4$



so...we can generalize...

EVEN MULTIPLICITY

ODD MULTIPLICITY



Let's GRAPH!!!

1. Find the following for: $k(x) = -x^3 - x^2 + 12x$

a) Determine the zeros and their multiplicity and whether they cross or touch the x-axis.

b) Determine the degree.

c) Determine the maximum possible number of turning points.

d) Find the y-intercept.

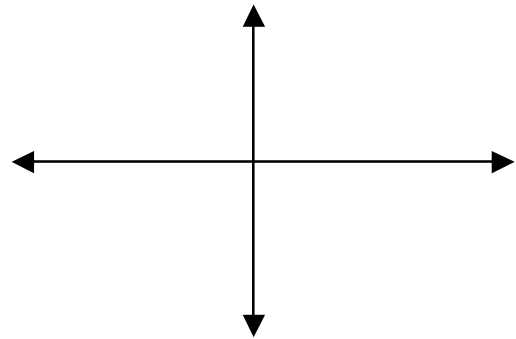
e) Determine the end behavior of $f(x)$.

f) Sketch the graph of the function.

Power function: $f(x) = \underline{\hspace{2cm}}$

$$\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$$

$$\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}}$$



2. Find the following for: $h(x) = (x - 3)^2(x + 2)$

a) Determine the zeros and their multiplicity and whether they cross or touch the x-axis.

b) Determine the degree.

c) Determine the maximum possible number of turning points.

d) Find the y-intercept.

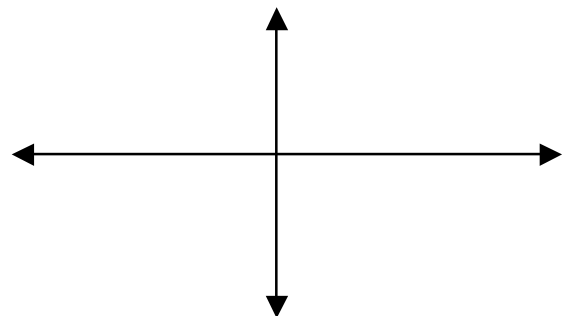
e) Determine the end behavior of $f(x)$.

f) Sketch the graph of the function.

Power function: $f(x) = \underline{\hspace{2cm}}$

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Your turn...

3. Find the following for: $h(x) = -x^2(x^2 - 4)(x - 5)$

a) Determine the zeros and their multiplicity and whether they cross or touch the x-axis.

b) Determine the degree.

c) Determine the maximum possible number of turning points.

d) Find the y-intercept.

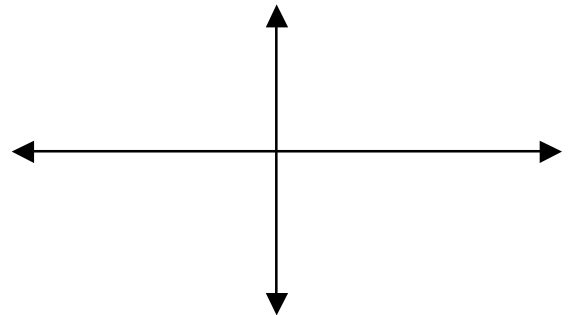
e) Determine the end behavior of $f(x)$.

f) Sketch the graph of the function.

Power function: $f(x) = \underline{\hspace{2cm}}$

$$\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$$

$$\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}}$$



4. Find the following for: $g(x) = (x - 1)^2(x - 3)(x + 1)$

a) Determine the zeros and their multiplicity and whether they cross or touch the x-axis.

b) Determine the degree.

c) Determine the maximum possible number of turning points.

d) Find the y-intercept.

e) Determine the end behavior of $f(x)$.

f) Sketch the graph of the function.

Power function: $f(x) = \underline{\hspace{2cm}}$

$$\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$$

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