7. Fill out these two tables by filling in the blanks.

Degree of Polynomial	Name by Degree
0	Constant
1	Linear
2	Quadratic
3	Cubic

# of terms in polyhomial	Name by # of terms
1	Monomial
2	Binomial
3	Trinomial

8. Is each of the below a polynomial? If not give a reason.

a) $y = \frac{3}{7}x^2 + 3x - 14x^4 + 4$

Yes. All exponents are whole numbers and coefficients are real numbers

b) $y = 4x^{-2} + x^3 - \frac{8}{x}$

No. There is a negative exponent and 8/x really represents $8x^{-1}$. This is a Rational Function

c) $y = 9\sqrt{x} + 3x^7 - x^{\frac{2}{3}}$

No. There is a fractional exponent and square root of x really represents $x^{1/2}$. This is a Radical Function.

d) $y = 9^x + 10ix^4 - 15$

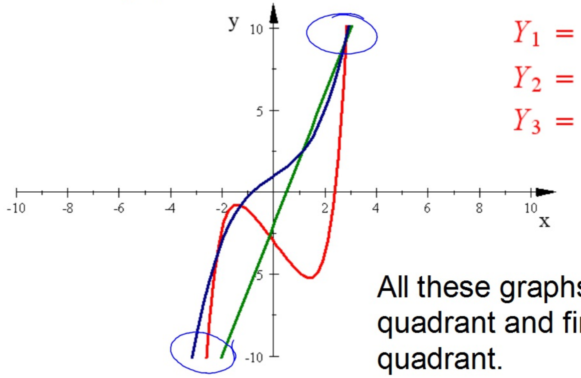
No. There is an imaginary coefficient and 9^x means there could be a negative or fractional exponent.
This is an Exponential Function.

Shapes of polynomial graphs.

Graph all three of these in a Standard Window:

$$Y_1 = 4x - 2$$
$$Y_2 = 0.25x^3 + x + 1$$
$$Y_3 = 0.1x^5 - 2x - 3$$

What do the graphs have in common?



$$Y_1 = 4x - 2$$
$$Y_2 = 0.25x^3 + x + 1$$
$$Y_3 = 0.1x^5 - 2x - 3$$

All these graphs start in the 3rd quadrant and finish in the 1st quadrant.

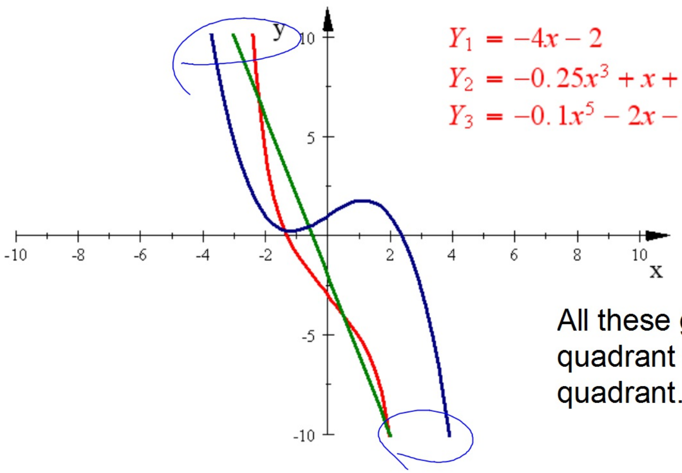
What do the equations have in common?

	Degree	Lead Coeff
$Y_1 = 4x - 2$	1	4
$Y_2 = 0.25x^3 + x + 1$	3	.25
$Y_3 = 0.1x^5 - 2x - 3$	5	.01
	ODD	POS

All Positive Odd polynomials start in the 3rd quadrant and finish in the 1st quadrant.

$$Y_1 = 4x - 2$$
$$Y_2 = 0.25x^3 + x + 1$$
$$Y_3 = 0.1x^5 - 2x - 3$$

What would happen if they all had a negative leading coefficient?

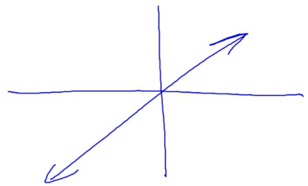


$$Y_1 = -4x - 2$$
$$Y_2 = -0.25x^3 + x + 1$$
$$Y_3 = -0.1x^5 - 2x - 3$$

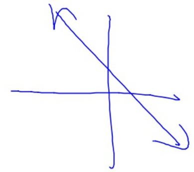
All these graphs start in the 2nd quadrant and finish in the 4th quadrant.

Odd Functions: Largest exponent is ODD when expanded
This is called the degree of the function.

Positive Leading Coefficient:
Moves from the third quadrant to the first quadrant.
Like a line with a Positive slope



Negative Leading Coefficient:
Moves from the second quadrant to the fourth quadrant.
Like a line with a Negative slope



Odd Functions

Positive Leading Coefficient:

Moves from the third quadrant to the first quadrant.

Like a line with a Positive slope

Negative Leading Coefficient:

Moves from the second quadrant to the fourth quadrant.

Like a line with a Negative slope

This is called the END BEHAVIOR of an ODD function

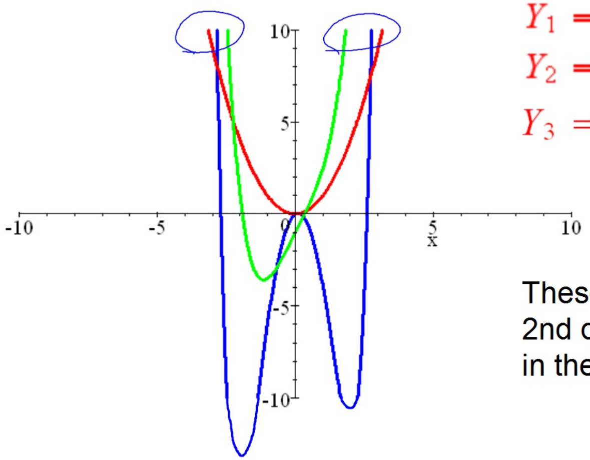
Graph all three of these in a Standard Window:

$$Y_1 = x^2$$

$$Y_2 = 0.5x^4 + 3x - 1$$

$$Y_3 = 0.1x^6 - 5x^2 + x$$

What do the graphs have in common?



$$Y_1 = x^2$$

$$Y_2 = 0.5x^4 + 3x - 1$$

$$Y_3 = 0.1x^6 - 5x^2 + x$$

These graphs all start in the 2nd quadrant and end in the 1st quadrant

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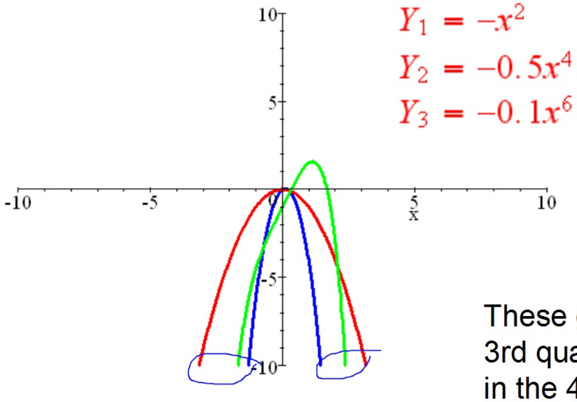
What do the equations have in common?

	Degree	Lead Coeff
$Y_1 = x^2$	2	1
$Y_2 = 0.5x^4 + 3x - 1$	4	.5
$Y_3 = 0.1x^6 - 5x^2 + x$	6	.1
	EVEN	POS

All Positive Even functions behave the same way ... they start in the 2nd quadrant and finish in the 1st quadrant

$$Y_1 = x^2$$
$$Y_2 = 0.5x^4 + 3x - 1$$
$$Y_3 = 0.1x^6 - 5x^2 + x$$

What would happen if they all had a negative leading coefficient?



$$Y_1 = -x^2$$
$$Y_2 = -0.5x^4 + 3x - 1$$
$$Y_3 = -0.1x^6 - 5x^2 + x$$

These graphs all start in the 3rd quadrant and end in the 4th quadrant

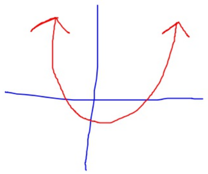
Even Functions: Largest exponent is EVEN when expanded

This is called the degree of the function.

Positive Leading Coefficient:

Moves from the second quadrant to the first quadrant.

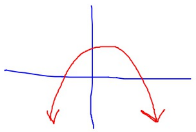
Like a parabola with a>0



Negative Leading Coefficient:

Moves from the third quadrant to the fourth quadrant.

Like a parabola with a<0



Even Functions

Positive Leading Coefficient:

Moves from the second quadrant to the first quadrant.

Like a parabola with a>0

Negative Leading Coefficient:

Moves from the third quadrant to the fourth quadrant.

Like a parabola with a<0

This is called the END BEHAVIOR of an EVEN function

End-Behavior:

The behavior of the graph on the far left and the far right.

How the value of the function (y) changes as x becomes
larger negative LEFT END $x \to -\infty$
and
larger positive RIGHT END. $x \to \infty$

END BEHAVIOR

EVEN Functions:

Positive Leading Coefficient:	Negative Leading Coefficient:
(↖ , ↗)	(↙ , ↘)
as $x \to -\infty, y \to \infty$	as $x \to -\infty, y \to -\infty$
as $x \to \infty, y \to \infty$	as $x \to \infty, y \to -\infty$

END BEHAVIOR

ODD Functions:

Positive Leading Coefficient:	Negative Leading Coefficient:
(↙ , ↗)	(↖ , ↘)
as $x \to -\infty, y \to -\infty$	as $x \to -\infty, y \to \infty$
as $x \to \infty, y \to \infty$	as $x \to \infty, y \to -\infty$

Give the end behavior of each polynomial.

1. $y = 5x^2 - 6x + 11x^4 - 9$

(↑ , ↗) EVEN POS

2. $y = 5x(x + 3)^2(x - 7)^3(2 - x)$

(↖ , ↘) ODD NEG