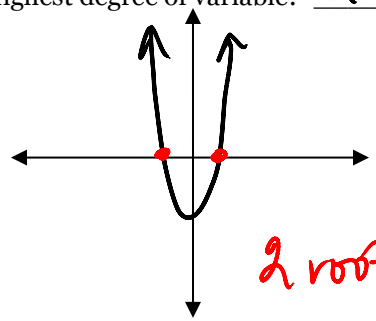
Algebra 2 Trig **Name:** KEY

Sect 6.4 - Quadratic Graph Transformations

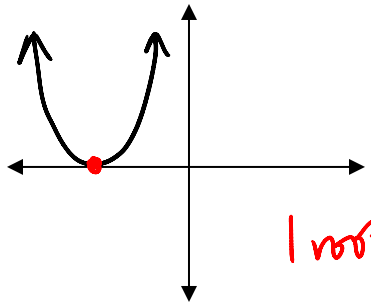
Using a graphing calculator, and working with your partner, look at the following graphs and roughly sketch them below. Use a "zoom 6" screen ☺

1) $y = 3x^2 - 5$
Highest degree of variable? 2



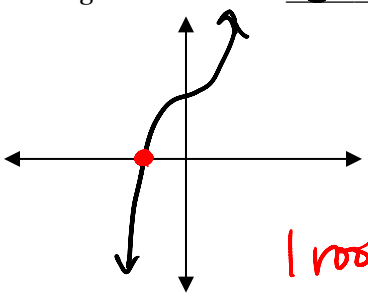
2 roots

2) $y = (x + 6)^2$
Highest degree of variable? 2



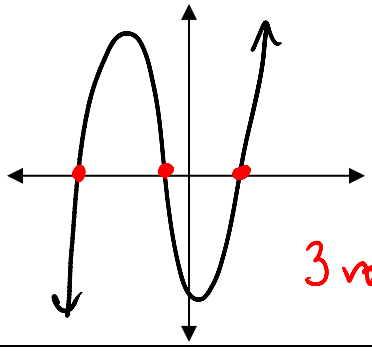
1 root

3) $y = x^3 + 3$
Highest degree of variable? 3



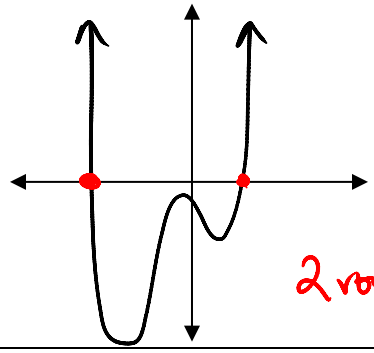
1 root

4) $y = x^3 + 4x^2 - 7x - 10$
Highest degree of variable? 3



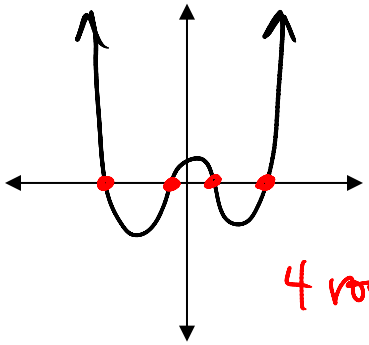
3 roots

5) $y = 2x^4 + 8x^3 - 8x - 4$
Highest degree of variable? 4



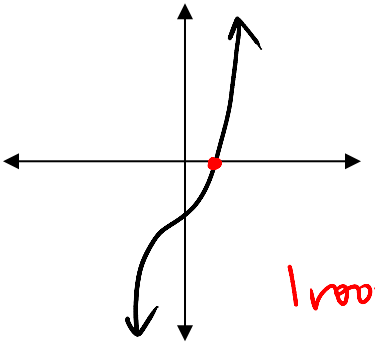
2 roots

6) $y = x^4 - 5x^2 + 4$
Highest degree of variable? 4



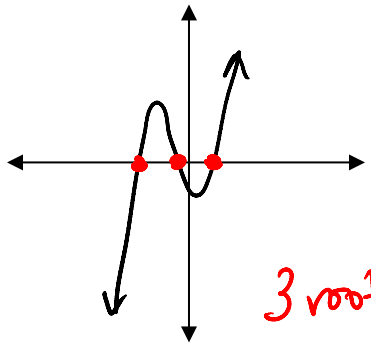
4 roots

7) $y = 3x^5 + 2x^4 + 2x - 4$
Highest degree of variable? 5

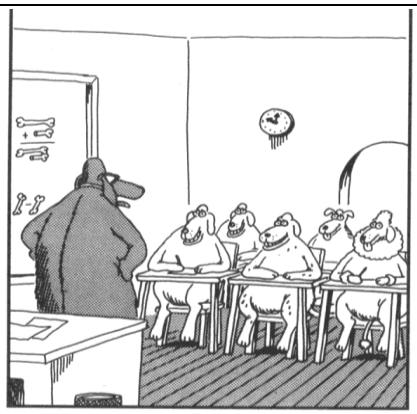


1 root

8) $y = x^5 + 2x^2 - 2x - 1$
Highest degree of variable? 5



3 roots



"Well, here we go again. ... Did anyone here *not* eat his or her homework on the way to school?"

Now look at the functions by highest degree. Do you know any similarities between quadratics (2nd) and quartics (4th degrees)? How about between cubics and quintics (5th degrees)?

end behavior is the same

end behavior is opposite

Looking at each function by degree, how many times CAN the graph hit the x axis?

x^5: 5 x^4: 4 x^3: 3 x^2: 2 x: 1

Let's summarize below:

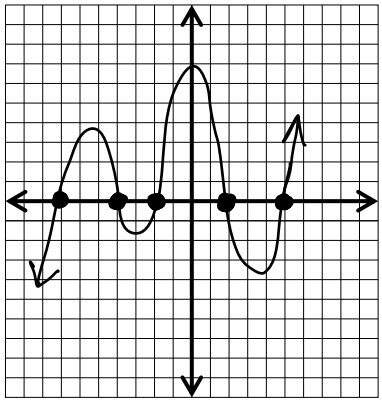
QUADRATIC (2nd degree)	CUBIC (3rd degree)	QUARTIC (4th degree)	QUINTIC (5th degree)
End Behavior: As $x \to \infty, y \to \infty$. As $x \to -\infty, y \to \infty$ 	End Behavior As $x \to \infty, y \to \infty$ As $x \to -\infty, y \to -\infty$ 	End Behavior As $x \to \infty, y \to \infty$ As $x \to -\infty, y \to \infty$ 	End behavior As $x \to \infty, y \to \infty$ As $x \to -\infty, y \to -\infty$ 

Would the end behavior change if there was a vertical or horizontal reflection?

YES!

State whether the following polynomials are an odd or even degree, describe the end behavior, and estimate the solutions to the polynomial.

1.

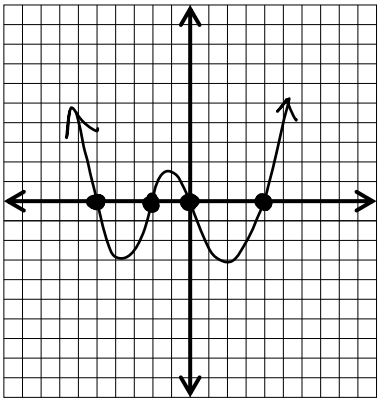


Odd or even: odd

End behavior:
As $x \to \infty, y \to \infty$
As $x \to -\infty, y \to -\infty$

Solutions (zeros):
$-7, -4, -2, 2, 5$

2.

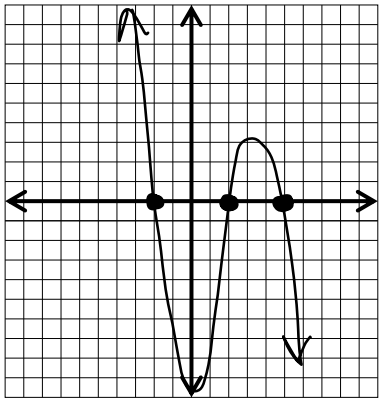


Odd or even: even

End behavior:
As $x \to \infty, y \to \infty$
As $x \to -\infty, y \to \infty$

Solutions (zeros):
$-5, -2, 0, 4$

3.



Odd or even: odd

End behavior:
As $x \to \infty, y \to -\infty$
As $x \to -\infty, y \to \infty$

Solutions (zeros):
$-2, 2, 5$

Use the following polynomials to answer the questions that follow.

$p(x) = x^2 - 5x + 3$ ***$k(x) = 9x^4 - 3x^2 + 1$*** ***$j(x) = -8x^3 + 2x^2 - 3$***

4. $p(-2)$

$p(-2) = (-2)^2 - 5(-2) + 3$
$= 4 + 10 + 3$
$= \boxed{17}$

5. $p(n + 5)$

$p(n+5) = (n+5)^2 - 5(n+5) + 3$
$= n^2 + 10n + 25 - 5n - 25 + 3$
$= \boxed{n^2 + 5n + 3}$

6. $k(n^3)$

$k(n^3) = 9(n^3)^4 - 3(n^3)^2 + 1$
$= \boxed{9n^{12} - 3n^6 + 1}$

7. $\frac{1}{2}[j(2n)]$

$\frac{1}{2}(j(2n)) = \frac{1}{2}(-8(2n)^3 + 2(2n)^2 - 3)$
$= \frac{1}{2}(-64n^3 + 8n^2 - 3)$
$= \boxed{-32n^3 + 4n^2 - \frac{3}{2}}$