Example: Your investment has been decreasing at a steady rate of 3.2% per year. If you originally invested \$3000, using the formula $A = a(1 \pm r)^t$, determine the number of years algebraically that it will take for your investment to reach \$1000. Round your answer to the nearest tenth of a year.

$$\frac{1000}{3000} = \frac{3000(1-.032)^t}{3000}$$

$$\frac{1}{3} = .968^t$$

$$\frac{\log\left(\frac{1}{3}\right)}{\log .968} = \frac{t \log .968}{\log .968}$$

$$t = \boxed{33.8 \text{ yrs}}$$

Example: In 2005, the deer population in Central New York was estimated to be 102, 541. After a study done in 2015, it was estimated that the deer population grew to 241, 730. Determine the rate of growth using the equation $N = N_0e^{kt}$. Round to the nearest ten-thousandths place.

$$\frac{241{,}730}{102{,}541} = \frac{102{,}541e^{K(10)}}{102{,}541}$$

$$\frac{241{,}730}{102{,}541} = e^{10K}$$

$$\frac{\ln\left(\frac{241{,}730}{102{,}541}\right)}{10} = \frac{10K \cancel{\ln e}}{10}$$

$$\boxed{K = .0858}$$

Regents Review #4 - Polynomials

Factoring Methods

GCF:

a) $3x^2 - 6x$

$3x(x-2)$

b) $2x^3 - 6x^2 + 10x$

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

DOTS:

a) $x^2 - 4$

$(x-2)(x+2)$

b) $25 - 64x^2$

$(5+8x)(5-8x)$

Grouping:

a) $\underbrace{x^3 - 2x^2}\ \underbrace{- 9x + 18}$

$x^2(x-2) - 9(x-2)$

$(x-2)(x^2-9) = (x-2)(x-3)(x+3)$

b) $\underbrace{2x^3 + x^2}\ \underbrace{+ 8x + 4}$

$x^2(2x+1)+4(2x+1)$

$(2x+1)(x^2+4)$

Prod/Sum:

$P=2(6)=12$
$S=13$
$1, 12$

a) $2x^2 + 13x + 6$

$2x^2+x+12x+6$

$x(2x+1)+6(2x+1)$

$(2x+1)(x+6)$

b) $x^2 - 3x - 40$

$(x-8)(x+5)$

$P=-40$
$S=-3$
$-8, 5$

Factor Completely:

GCF 1st

a) $36x^2 - 4y^2$

$4(9x^2-y^2)$

$4(3x-y)(3x+y)$

b) $12x^2 - 27$

$3(4x^2-9)$

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

Sum or Difference of Cubes:

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

SOAP

a^3+b^3 $\sqrt{a^3} = \sqrt{x^3}$

a) $x^3 + 8$

$a = x$

$b = \sqrt[3]{8} = 2$

$\boxed{(x+2)(x^2-2x+4)}$

b) $y^3 - 125$

$a = \sqrt[3]{y^3} = y$

$b = \sqrt[3]{125} = 5 \leftarrow +$

$\boxed{(y-5)(y^2+5y+25)}$

Zero of a Polynomial: The zero of a polynomial P(x) is the value of x for P(x) = 0.

$y=0$
x-int

Ex: Find the zero(s) of each

a) $f(x) = x^2 + 4x$

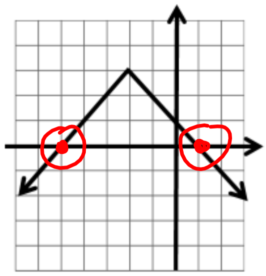
$0 = x^2+4x$

$0 = x(x+4)$

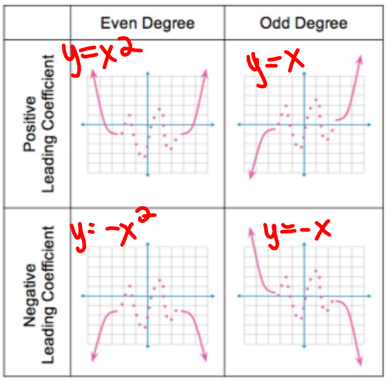
$x=0$ | $x+4=0$, $x=-4$

$\{0, -4\}$

b)



$\{-5, 1\}$



	Z	M	T/C (Even odd)
x=0	0	1	C
x+3=0	-3	2	T
x-1=0	1	1	C

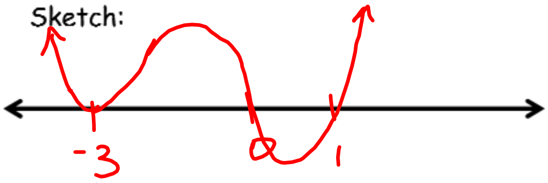
Find the zeros of the polynomial, state the multiplicity of each. Sketch (including the end behavior)

$P(x) = x^1(x + 3)^2(x - 1)^1$

Degree: $1+2+1=4$

End Behavior: Even LC +

Sketch:



Use long division to find the quotient (Q(x)) and remainder (R(x)). Verify your remainder with the remainder theorem.

$(2x^3 + 5x^2 + 3x - 4) \div (x + 2)$

Is (x + 2) a factor of $2x^3 + 5x^2 + 3x - 4$? Explain your answer.