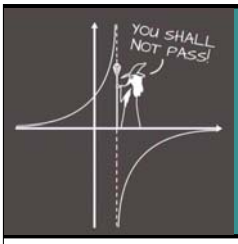
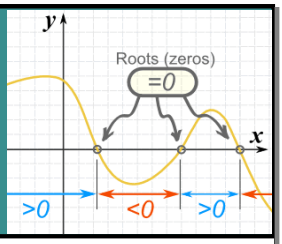


Unit 3: Polynomial, Radical, and Rational Functions

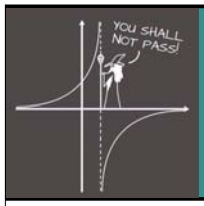


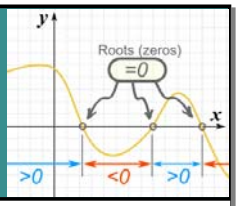
3.5 Determining the Equation of a Polynomial

$$P(x) = a(x - a)(x - b)(x - c)...$$

Here's the information you may be given in a question or on a graph in order to write the equation:

- roots (x-int, related to factors)
- multiplicities of roots
- degree of the equation
- a point on the graph *(x,y)*





Ex.) A polynomial function has zeros at -3 and 4 and passes through the point (1,15). The multiplicity of (-3,0) is 1 and the multiplicity of (4, 0) is 2. Find *P(x)*. x, y

$P(x) = a(x+3)(x-4)^2$

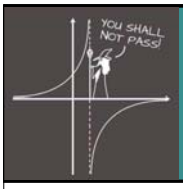
$15 = a(1+3)(1-4)^2$

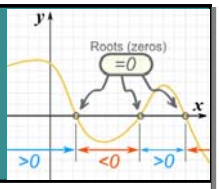
$15 = a(4)(9)$

$\frac{15}{36} = \frac{36a}{36}$

$a = 5/12$

$P(x) = 5/12(x+3)(x-4)^2$





Ex.) Determine the equations for the following:

a) Roots at x = 3, x = 4, x = -7 and it passes through (2, 54).

x y

$P(x)=a(x-3)(x-4)(x+7)$

$54=a(2-3)(2-4)(2+7)$

$54=a(-1)(-2)(9)$

$54=18a$

$a=3$

$P(x)=3(x-3)(x-4)(x+7)$

b) Roots at x = 4 multiplicity of 3, x = 1 multiplicity of 2, and passes through (0, 32).

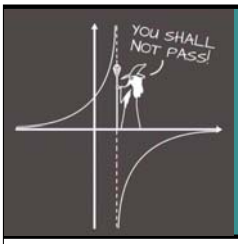
$P(x)=a(x-4)^3(x-1)^2$

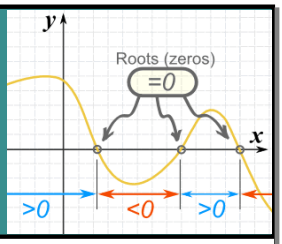
$32=a(0-4)^3(0-1)^2$

$32=-64a$

$a=-1/2$

$P(x)=-1/2(x-4)^3(x-1)^2$





c) Roots at x = 0, -4, 2(mult. of 2) and passes through (-2,128).

$P(x)=a(x-0)(x+4)(x-2)^2$

$128=a(-2)(2)(-4)^2$

$128=-64a$

$a=-2$

$P(x)=-2x(x+4)(x-2)^2$