3.2 Graphing Polynomial Functions

Graphing Multiplicities:

a.) If $(x-a)$ has a multiplicity of 1 then the graph crosses the x-axis directly at $x=a$.

ie: $(x-a)^1$ …

b.) If $(x-a)$ has a multiplicity that is **even**, then the graph touches and bounces off the x-axis at $x=a$.

ie: $(x-a)^2$ or $(x-a)^4$

c.) If $(x-a)$ has a multiplicity that is **odd**, then the graph passes through the x-axis at $x=a$ with a curve similar to the function $y=x^3$.

$(x-a)^3$ or $(x-a)^5$

Graphing functions:

Step 1: Determine the general shape of the graph (end behaviours/degree)

Step 2: Determine and plot zeroes; find their multiplicities.

Step 3: Plot other reasonable points (y-intercept)

Step 4: Sketch the graph

Example 1: Sketch the following

a.) $y = (x + 3)(x - 1)^2(x - 5)^3$

b.) $y = x^4(2 - x)^2(x - 4)$

c.) $y = (3 - x)^3(x + 1)^2(x - 2)^2$

Equation of Polynomial Functions

To find the equation of a polynomial

a) Determine the zeroes and their possible multiplicity

b) Write the equation down in factored form; leave a coefficient in front

c) Choose a non-zero point and solve for the coefficient

Example 2:

A polynomial has roots: 2, 2, 2, 1, -5 and passes through the point (3, 4). Determine the equation of the polynomial.

Example 3:

Determine the equation of the following with the least possible degree. Note that (-1, 21) is a point on the graph.