

Linear Functions

Standard/General form: $f(x) = ax + b$

Slope/rate of change $a/m = y_2 - y_1 / x_2 - x_1$

y-intercept b

Slope intercept form $f(x) = mx + b$

Point-slope form $y - y_1 = y_2 - y_1 / x_2 - x_1 (x - x_1)$

Variable occurs to the **first power only**

The graph is a line

Constant rate of change

Positive rate of change \rightarrow Slope Upward

Negative rate of change \rightarrow Slope Downward

Effects of Changing h and k

vertex form: (h, k)

Changing h $x = h$; horizontal shift

Changing k $y = k$; vertical shift

How to solve Polynomial Functions

1. Factor out (no exponent is inside the parenthesis)

2. Set the function equal to zero

3. Solve for x

4. Find Multiplicity

5. Find x and y intercept. Use 0, if imaginary use 2 numbers that are symmetric to each other

6. Plot out the x you solve on step 3 sa x-axis

7. Plot the x and y intercepts on step 5

7 Check if tama ang graph using ang leadig coefficient

Create Quadratic func. with the Vertex and points

1. Substitute the vertex to the function

2. Substitute x and y intercept

3. Solve for a

Formula:

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

Quadratic Functions

General form $f(x) = ax + bx + c$

Standard form $f(x) = a(x - h) + k$

Vertex (h, k)

Polynomial function of degree 2

Graph of f is a **parabola**

Parabola opens upward $a > 0 (+)$: minimum

parabola opens downward $a < 0 (-)$: maximum

How to graph Quadratic Functions

1. Expressing in standard form by completing the square or using $x = -b/2a$

2. Find Vertex

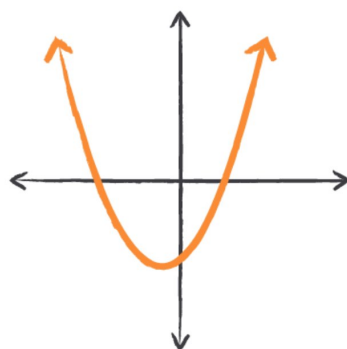
3. Identify max/min

4. Find x and y intercept

5. Plot Vertex and points

6. Find domain ad range **Note:** Domain is always real number

Even Coefficient Graph



Same Direction sa start and end If Positive:

Upward If Negative: Downward

Odd Coefficient

Polynomial Function

Example sa form $f(x) = 2x^3 - 6x^2 + 10$

Exponents Always positive exponents and no fractional exponents

Coefficients 2, -6

Constant 10

coefficient/-

Constant term

Leading coeffi- 2
cient

Leading term $2x^3$

It is continuous; graph has no breaks or holes

Note: Dapat always sunod ang mga terms depende sa # of degree or exponents. If kulangan butangan ug 0 ^{ang} exponent

Higher exponent (even) Steeper, flatter

Higher exponent (odd) wider

Remainder Theorem

$$P(x) = \frac{x^3 - 4x^2 - 7x + 10}{x - 2}$$

$$x - 2 = 0$$

$$x = 2$$

$$P(2) = (2)^3 - 4(2)^2 - 7(2) + 10$$

$$= -12 \leftarrow \text{remainder}$$

If a polynomial $p(x)$ is divided by the binomial $x - a$, the remainder obtained is $p(a)$

Factor Theorem

$$p(x) = \frac{x^3 - 3x^2 + 3x - 1}{x - 1}$$

$$x - 1 = 0$$

$$x = 1$$

$$p(1) = (1)^3 - 3(1)^2 + 3(1) - 1$$

$$= 0 \leftarrow \text{Factor}$$

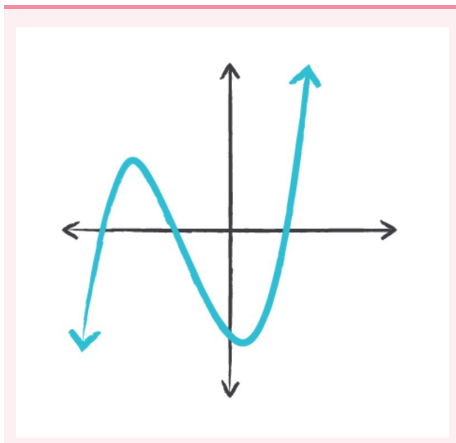
$$p(x) = \frac{x^3 - 3x^2 + 3x - 1}{x - 1} = 1x^2 - 2x + 1$$

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

$$= (x-1)(x-1)(x-1)$$

$$= (x-1)^3$$

C is a zero of p if and only $x - c$ is a factor of $P(x)$



Opposite Directions If Positive: ascending, If Negative: descending



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