NOTES 6.2: Characteristics of the Equations of Polynomial Functions

- the ***standard form*** of a function gives us information about the function based on the leading coefficient and the constant term
  - the ***leading coefficient*** is the coefficient of the term with the greatest degree in a polynomial function

    ex.

    $y = 2x^3 + 8x^2 - x + 5$

    ↖ leading coefficient

- the ***constant term*** is the term in a polynomial function that does not have a variable

  ex.

  $f(x) = 2x^3 + 8x^2 - x + 5$

  ↑ constant

- different functions have different standard forms

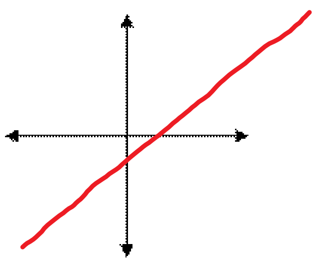
ex. 1. linear function → $f(x) = ax + b$ where $a \neq 0$

2. quadratic function → $f(x) = ax^2 + bx + c$ where $a \neq 0$

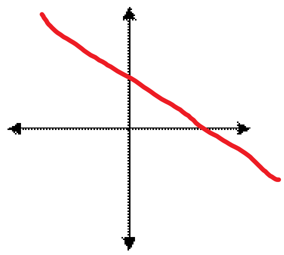
3a) cubic function → $f(x) = ax^3 + bx^2 + cx + d$ where $a \neq 0$

Ex #1 a) Use your graphing calculator with a standard window setting to sketch the following graphs.

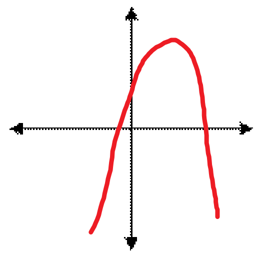
$y = 2x - 6$



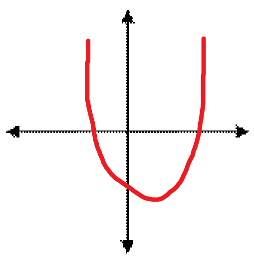
b) $y = -x + 5$



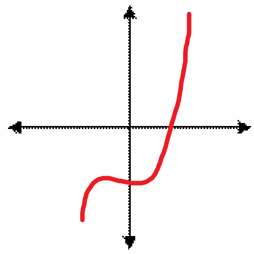
c) $y = -2x^2 + 2x + 7$



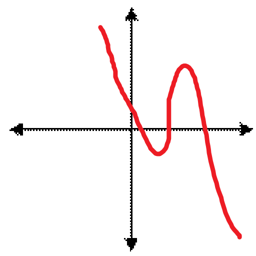
d) $y = x^2 - 4x - 2$



e) $y = x^3 - 5$



f) $y = -x^3 + 6x^2 - 10x + 4$



b) How is the constant term of the function related to the y-intercept of the graph?

is the y-intercept

c) Complete the table below.

		End Behavior	

Sign of leading coefficient	Linear function	Quadratic function	Cubic function
+	(−, +)	(+, +)	(−, +)
−	+, −	−, −	+, −

d) Which two properties of a function can be predicted from the standard form of the equation?

* end behaviour
# y-intercept

e) How can changing the constant term of a cubic function change the number of x-intercepts on the graph?

a negative constant ⇒ shifts the graph↓
⇒ reduces # of x-int

f) Why does the sign of the leading coefficient affect the end behavior of the graph?

its on the term with highest exponent ∴ will have the greatest effect on the y-value

g) How does the degree of a polynomial function relate to the maximum number of:

i) x-intercepts the graph may have?

max # of x-intercepts = degree of function

ii) turning points the graph may have?

will be 1 less than the degree

Ex #2 Determine the ***characteristics*** of each function using its equation.

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

b) $f(x) = -5x^2 + 2x - 1$

	a)	b)
a) number of x-intercepts	1	0
b) y-intercept	(0, 2)	(0, −1)
c) end behavior	(−, +)	(−, −)
d) domain	x = all the real #	x = all the real #
e) range	y = all real #	y ≤ max
f) number of possible turning points	0	1