2.2 - Graphs of Equations

- Equations can give a relationship between x & y (variables).

Ex ① $y = x^3 - 7$

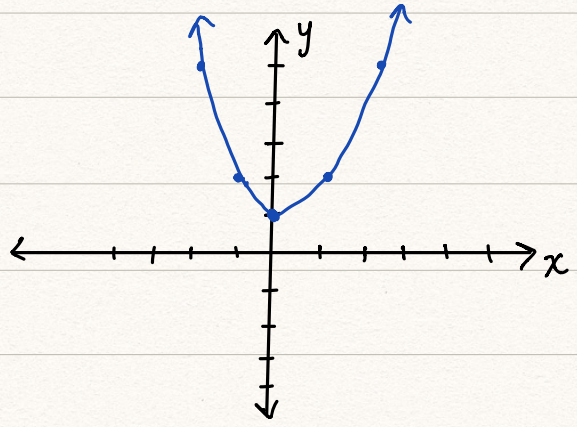
② $y^2 + x^2 = 42$

③ $y = x^5 - 7x^4 + 3x^2 - 1$

Graphing Equations

$y = x^2 + 1$

x	y
-3	10
-2	5
-1	2
0	1
1	2
2	5
3	10



Intercepts of a Graph

- y-intercept: y-value(s) where the graph crosses y-axis
- x-intercept: x-value(s) " " x-axis.

- In an equation, to find

y-intercept(s) ⟶ set $x = 0$

x-intercept(s) ⟶ set $y = 0$

Symmetry of a Graph

Symmetric about y-axis: ① replace x with $-x$ everywhere
② simplify
③ Is the equation the same as original?
If yes, then it is symmetric about y-axis.

Symmetric about x-axis ① replace y with $-y$ everywhere
② same
③ same

Symmetric about origin: ① replace x with $-x$, & y with $-y$
② same
③ same.

Equation of a circle:

- Circle with center (h, k), and radius r has equation

$$(x-h)^2 + (y-k)^2 = r^2 \quad \text{(standard form)}.$$

Ex: ① $(x-2)^2 + y^2 = 17$

center: $(2, 0)$

radius: $\sqrt{17}$

$17 = r^2$

$\pm\sqrt{17} = r$

$\Rightarrow r = \sqrt{17}$

② $x^2+y^2-4x-2y-15=0$

$(x^2-4x)+(y^2-2y)=15$

$x^2-4x+\left(\frac{-4}{2}\right)^2+y^2-2y+\left(\frac{-2}{2}\right)^2=15+\left(-\frac{4}{2}\right)^2+\left(\frac{-2}{2}\right)^2$

$(x-2)^2+(y-1)^2=15+4+1$

$(x-2)^2+(y-1)^2=20$

Center: $(2,1)$

radius: $\sqrt{20}=\sqrt{4\cdot5}=2\sqrt{5}$

$20=r^2$

$r=\pm\sqrt{20}$

$r=\sqrt{20}$