Shifting Curves I

$y = f(x) + c \ \{\text{or } (y - c) = f(x)\}$

moves $f(x)$ $\underset{+}{\Uparrow}$ or $\underset{-}{\Downarrow}$ c units

$y = f(x + c)$

moves $f(x)$ $\underset{+}{\Leftarrow}$ or $\underset{-}{\Rightarrow}$ c units

$y = -f(x)$

reflects $f(x)$ in the x axis (i.e. flips upside down)

$y = f(-x)$
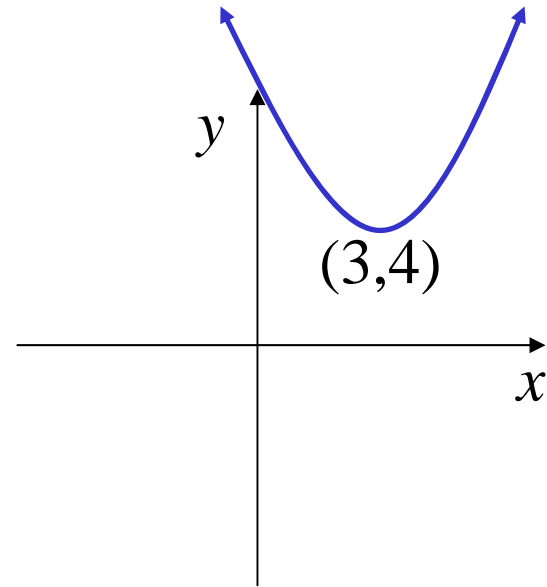
reflects $f(x)$ in the y axis

e.g. $(i)\ y = (x-3)^2 + 4$

    1. *basic curve* : $y = x^2$
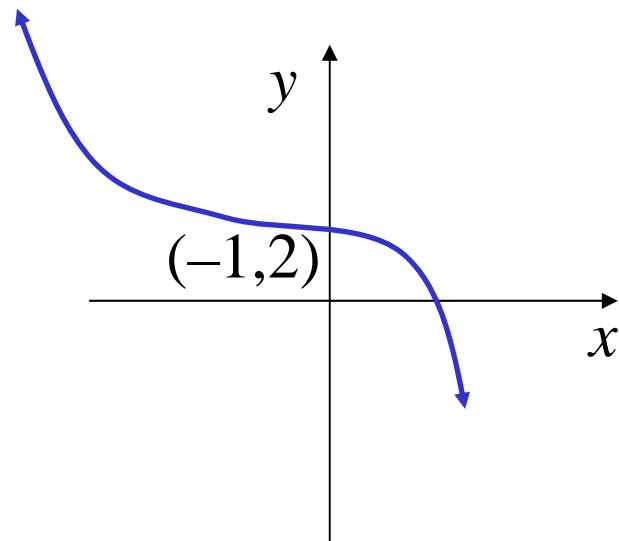
    2. *shift right 3 units*

    3. *shift up 4 units*

(3,4)

$(ii)\ y = -(x+1)^3 + 2$

    1. *basic curve* : $y = x^3$

    2. *reflect in x axis*
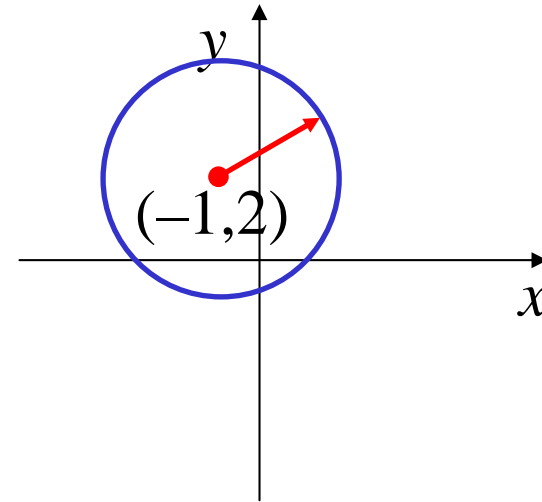
    3. *shift left 1 unit*

    4. *shift up 2 units*

(–1,2)

(iii) $x^2 + 2x + y^2 - 4y - 4 = 0$

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

$$= 9$$

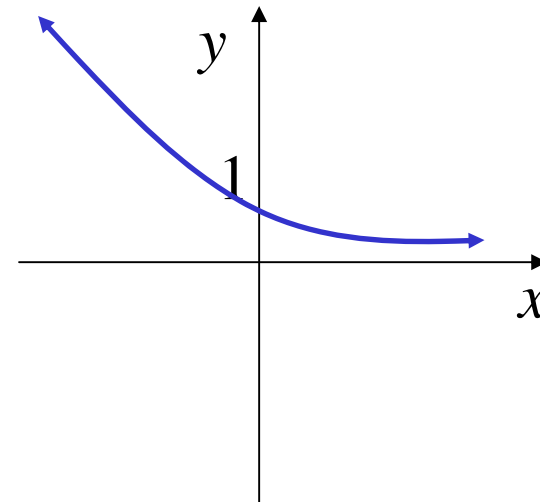1. *basic curve* : $x^2 + y^2 = 9$

2. *shift left 1 unit*

3. *shift up 2 units*

(iii) $y = 2^{-x}$

1. *basic curve* : $y = 2^x$

2. *reflect in y axis*

Exercise 2I; 1bdefg, 3abdf, 4, 5ace, 6bdf, 7ac, 9, 10acgnpr, 12