Shifting Curves II

$y = kf(x)$ $k > 1$, curve is steeper

OR $0 < k < 1$, curve is shallower

$\dfrac{y}{k} = f(x)$ *(curve is stretched vertically)*
domain unchanged, range altered

$y = f(kx)$ $k > 1$, curve is steeper

$0 < k < 1$, curve is shallower

(curve is stretched horizontally)
domain altered, range unchanged

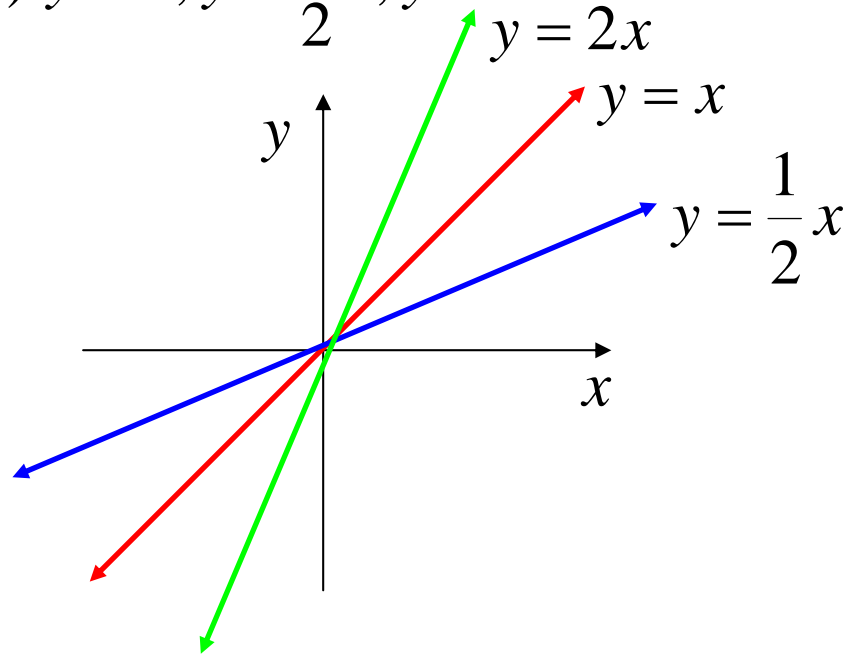$y = \dfrac{1}{f(x)}$ x intercepts $\Rightarrow$ asymptotes

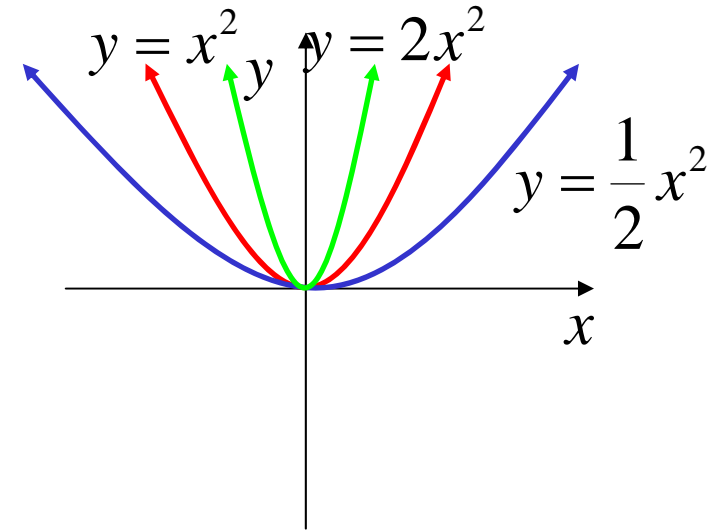asymptotes $\Rightarrow$ x intercepts

$y > 1 \Rightarrow y < 1$

$y < 1 \Rightarrow y > 1$

e.g. (i) on one graph draw

$a)$ $y = x,\ y = \dfrac{1}{2}x,\ y = 2x$

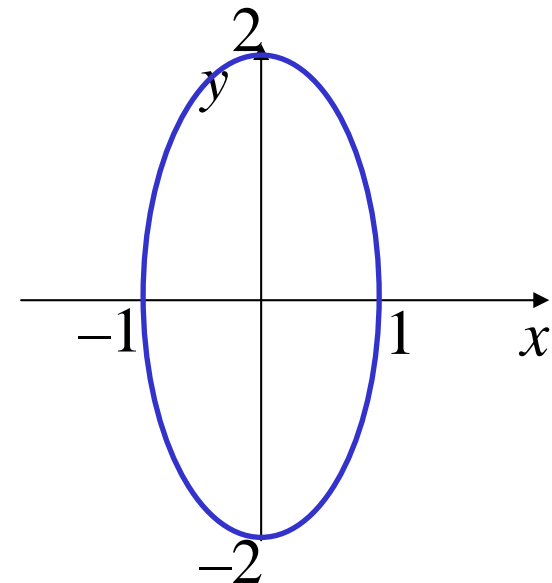$b)$ $y = x^2,\ y = \dfrac{1}{2}x^2,\ y = 2x^2$

(ii) Sketch $x^2 + \dfrac{y^2}{4} = 1$

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

2. $\dfrac{y^2}{4} = \left(\dfrac{y}{2}\right)^2 ,\ \therefore k = 2$

stretch vertically by a factor of 2

$(iii)\ y = \dfrac{1}{2-x^2}$

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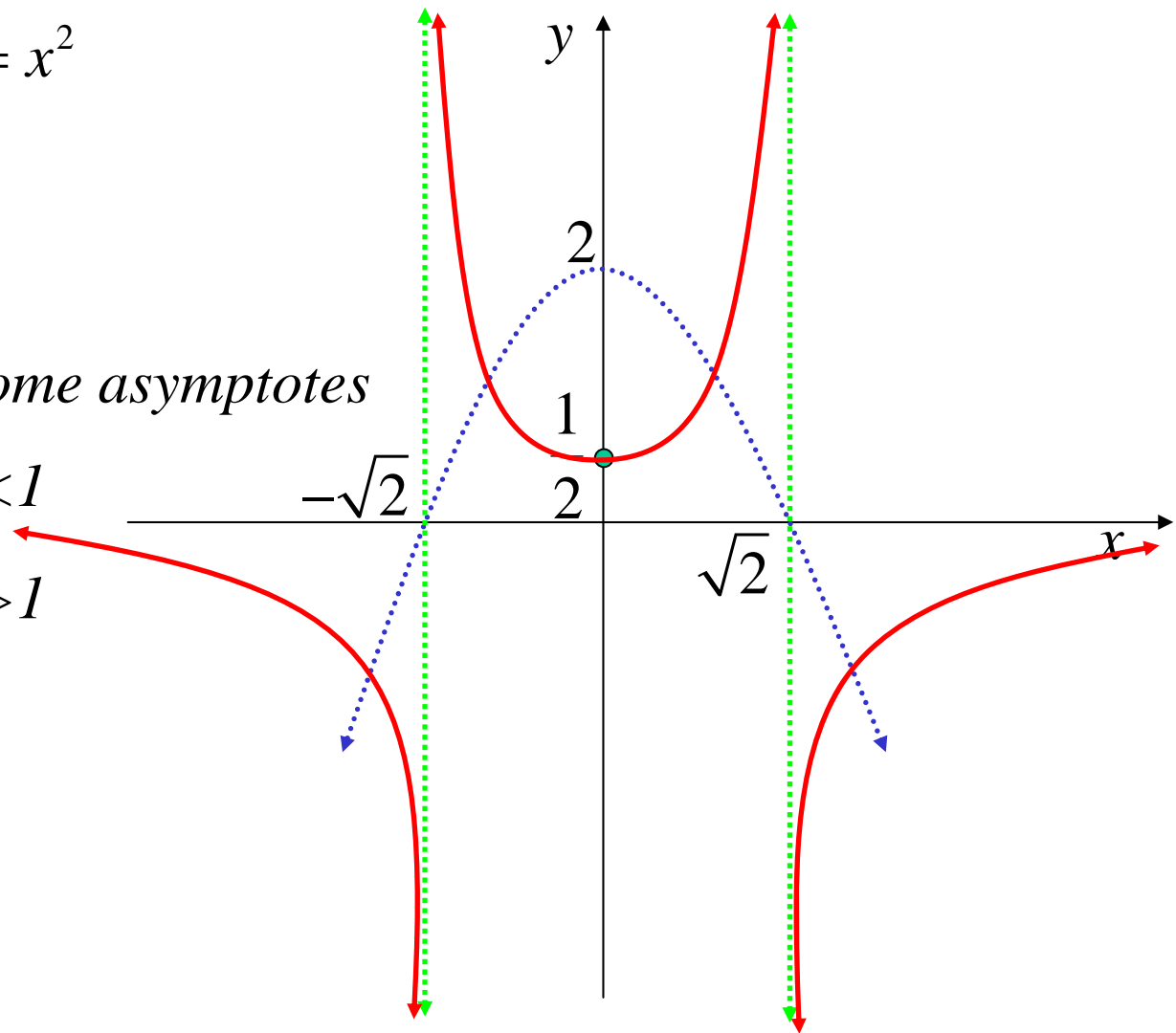
2. *reflect in x axis*

3. *shift up 2 units*

4. *x intercepts become asymptotes*

5. $y > 1$ *become* $y < 1$

6. $y < 1$ *become* $y > 1$

$(iv)\ y = x + \dfrac{1}{x}$

1. *draw the basic curves* :

$$y = x \text{ and } y = \dfrac{1}{x}$$
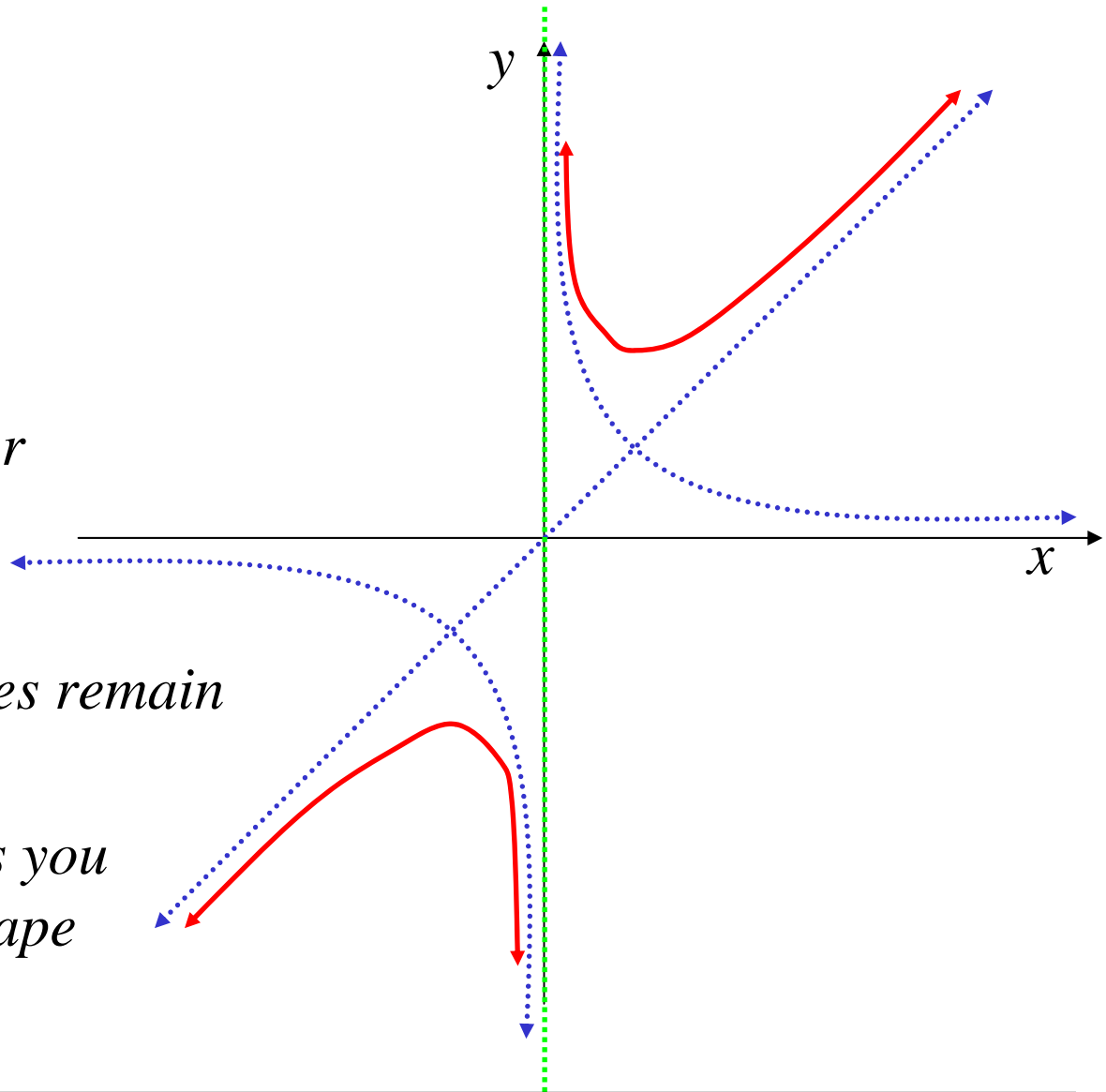
2. *add the y values together*

* *choose key points first*
  - *x intercepts*
     note: vertical asymptotes remain
  - *points of intersection*
  - *as many other points as you*
    need to work out the shape

Exercise 2J: 1, 2a, 3b, 4c, 5ac, 6b, 7ac, 8, 9