

2A The |Modulus| Function

1. The function $f(x)$ is defined

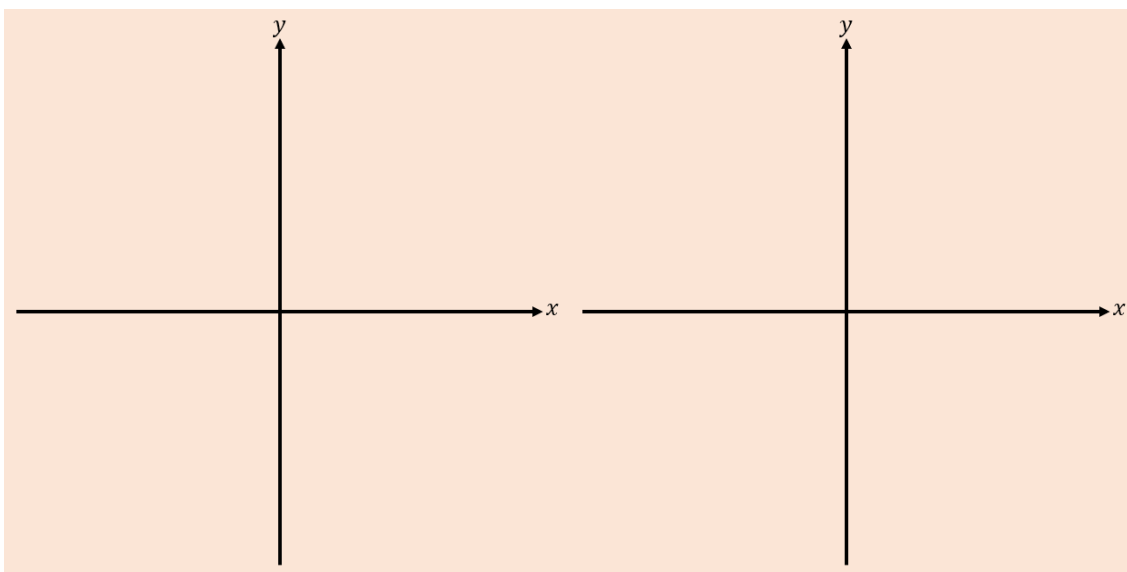
$$f(x) = |2x - 3| + 1$$

find:

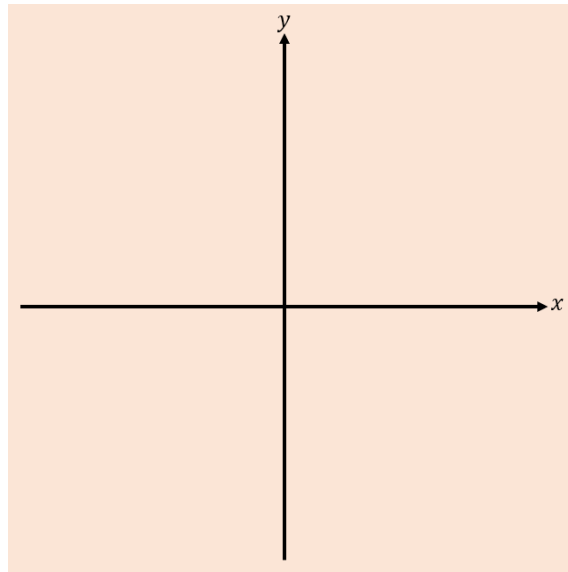
a) $f(5)$

b) -1

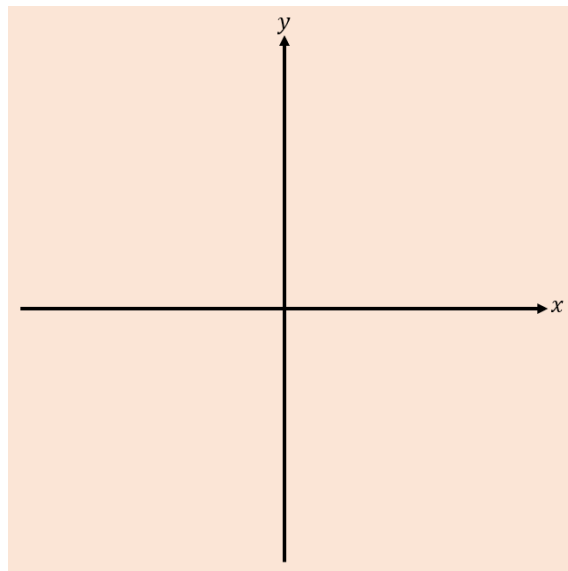
2. a) Sketch the graph of $y = |3x - 2|$



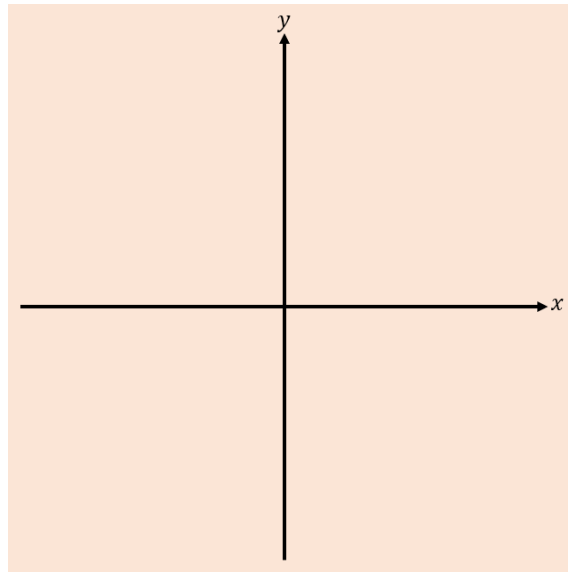
b) Solve the equation $|2x - 1| = 5$



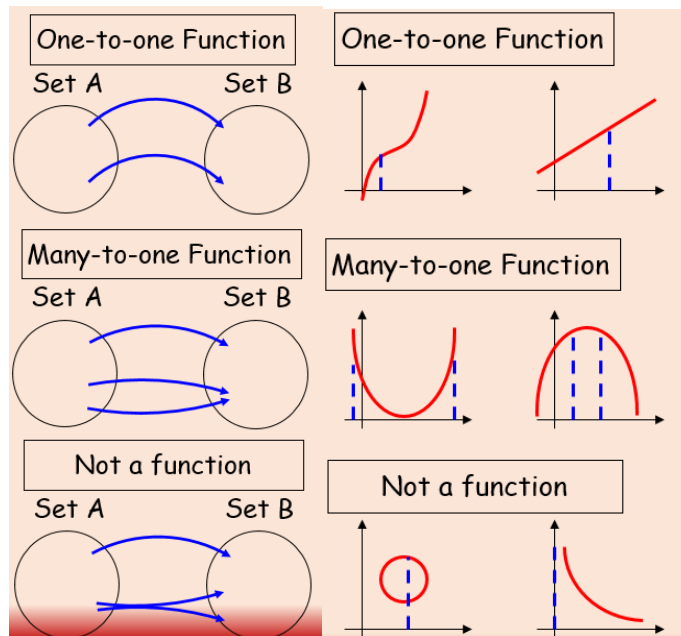
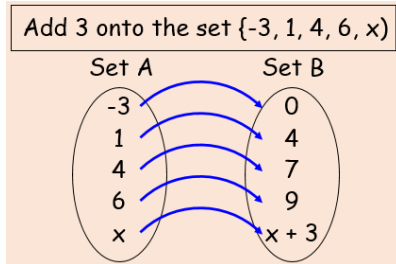
c) Solve the equation $|3x - 5| = 2 - \frac{1}{2}x$



d) Solve the inequality $|5x - 1| > 3x$



2B Part 1 Domains & Ranges



1. Find the range of the following function, and state if it is one-to-one or many-to-one.

a) $f(x) = 3x - 2$, domain $\{x = 1, 2, 3, 4\}$

b) $f(x) = 3x - 2$, $\{x = 1, 2, 3, 4\}$

c) $g(x) = x^2$, domain $\{x \in \mathbb{R}, -5 \leq x \leq 5\}$

d) $g(x) = x^2$, $\{-5 \leq x \leq 5\}$

e) $h(x) = 1/x$, domain $\{x \in \mathbb{R}, 0 < x \leq 3\}$

f) $h(x) = 1/x$, $\{x \in \mathbb{R}, 0 < x \leq 3\}$

2B Part 2 Solving Equations with Functions

1. Given that the function $g(x) = 2x^2 + 3$, find;

a) the value of $g(3)$

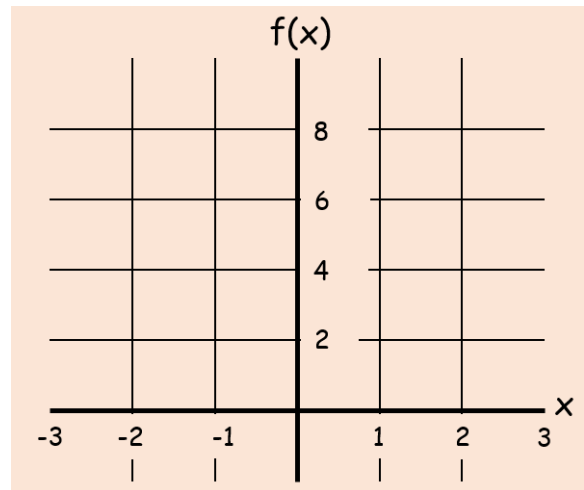
b) the value(s) of a such that $g(a) = 35$

c) the range of the function

2. The function $f(x)$ is defined by:

$$f(x) = \begin{cases} 5 - 2x & x < 1 \\ x^2 + 3 & x \geq 1 \end{cases}$$

a) Sketch $f(x)$ stating its range



b) Find the values of a such that $f(a) = 19$

2C Composite Functions

1. Given:

$$f(x) = x^2$$

$$g(x) = x + 1$$

Find:

a) $fg(x)$

b) $gf(x)$

2. Given:

$$f(x) = 3x + 2$$

$$g(x) = x^2 + 4$$

Find:

a) $fg(x)$

b) $gf(x)$

c) $f^2(x)$

d) The values of b so that $fg(b) = 62$

3. The functions f and g are defined by:

$$f: x \rightarrow |2x - 8|$$

$$g: x \rightarrow \frac{x + 1}{2}$$

a) Find $fg(3)$

b) Solve $fg(x) = x$

2D Inverse Functions

1. Find the inverse of the function:

$$f(x) = \frac{3}{x-1}, \{x \in \mathbb{R}, x \neq 1\}$$

2. The function:

$$f(x) = \sqrt{x-2}, \quad x \in \mathbb{R}, \quad x \geq 2$$

a) State the range of $f(x)$

b) Find the function $f^{-1}(x)$ and state its domain and range

c) Sketch $y = f(x)$ and $y = f^{-1}(x)$ and the line $y = x$

3. The function $f(x)$ is defined by:

$$f(x) = x^2 - 3, x \in \mathbb{R}, x \geq 0.$$

a) Find $f^{-1}(x)$

b) Sketch $y = f^{-1}(x)$ and state its domain

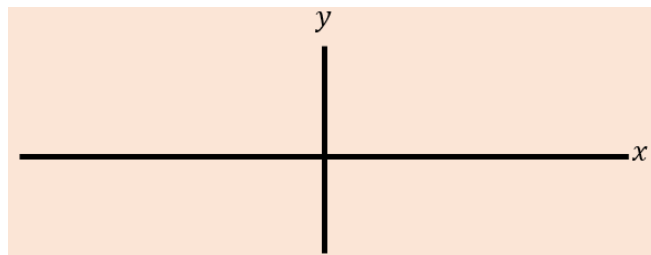
c) Solve the equation $f(x) = f^{-1}(x)$

2E Modulus Graphs

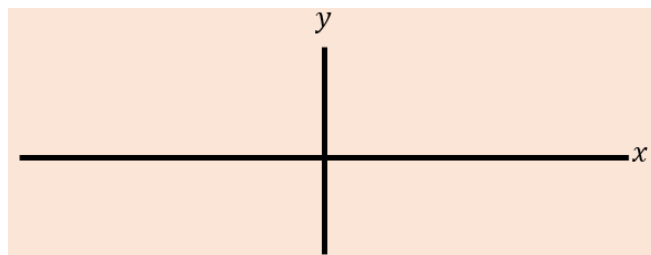
1. Given that:

$$g(x) = \sin x, \quad -360 \leq x \leq 360$$

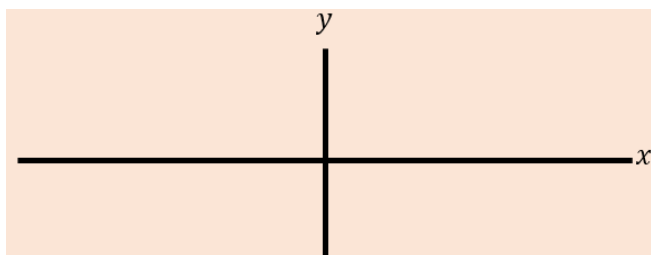
a) Sketch $y = g(x)$



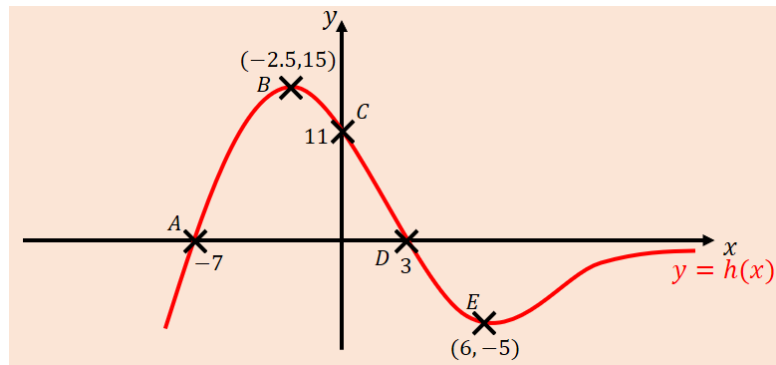
b) Sketch $y = |g(x)|$



c) Sketch $y = g(|x|)$

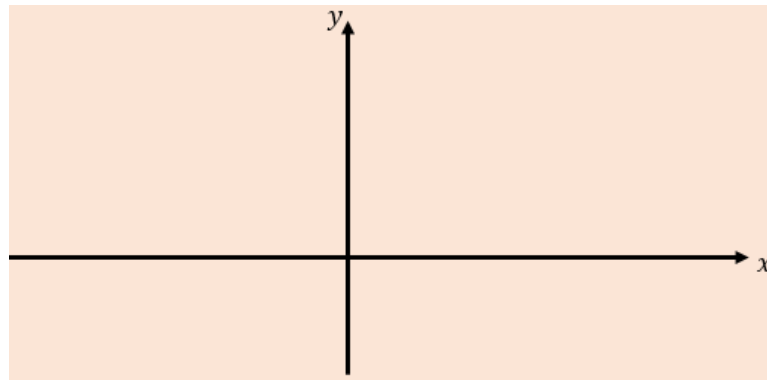


2. The diagram shows the graph of $y = h(x)$, with five points labelled.

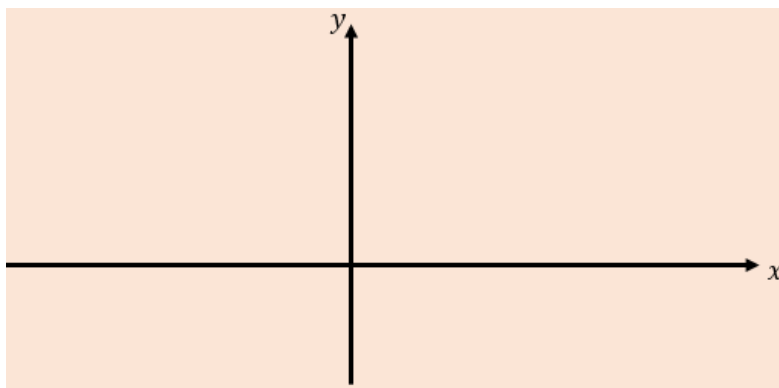


Sketch each of the following graphs, labelling points corresponding to A, B, C, D and E , as well as any intersections with the axes.

a) $y = |h(x)|$

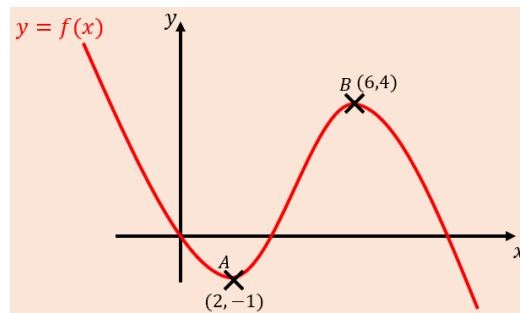


b) $y = h(|x|)$

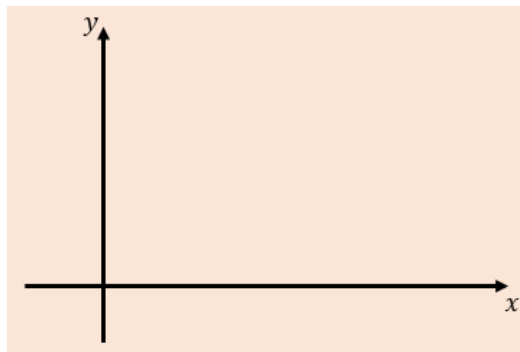


2F Multiple Graphical Transformations

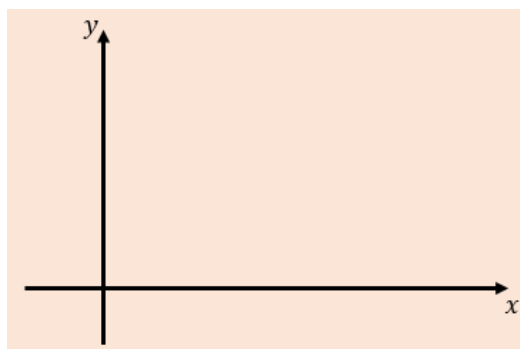
1. The diagram shows the sketch of $y = f(x)$.



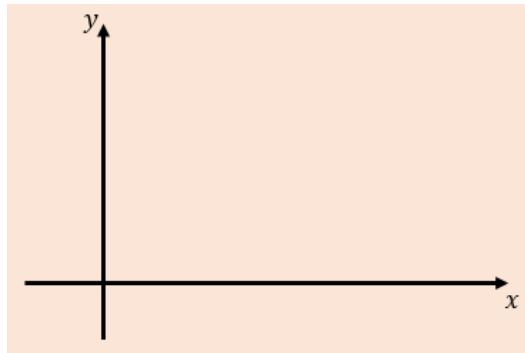
- a) Sketch the graph of $y = 2f(x) - 1$



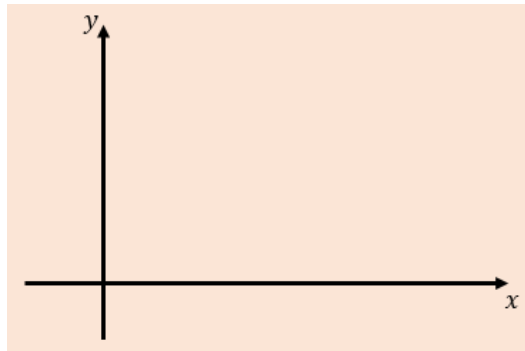
- b) Sketch the graph of $y = f(x + 2) + 2$



c) Sketch the graph of $y = \frac{1}{4}f(2x)$



d) Sketch the graph of $y = -f(x - 1)$

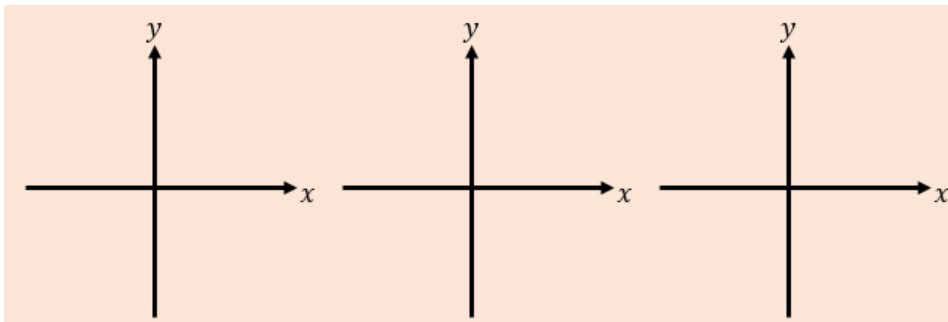


2. Given that:

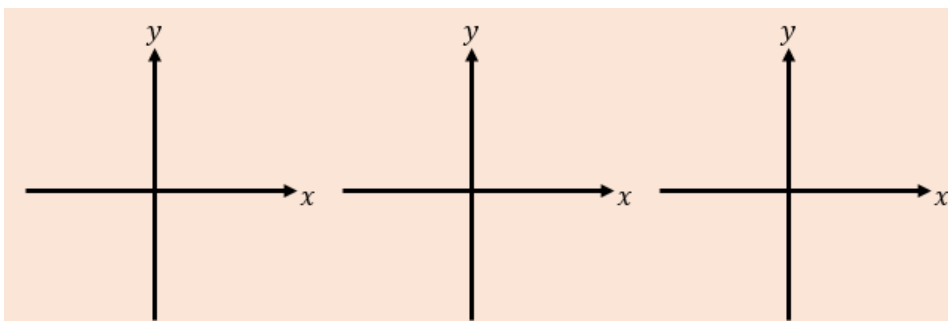
$$f(x) = \ln x, x > 0$$

Sketch the graphs of:

a) $y = 2f(x) - 3$



b) $y = |f(-x)|$

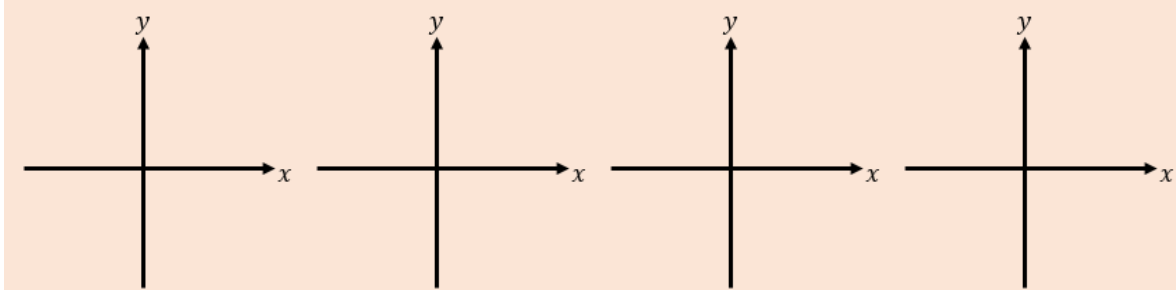


2G Solving Modulus Equations

1. Given the function:

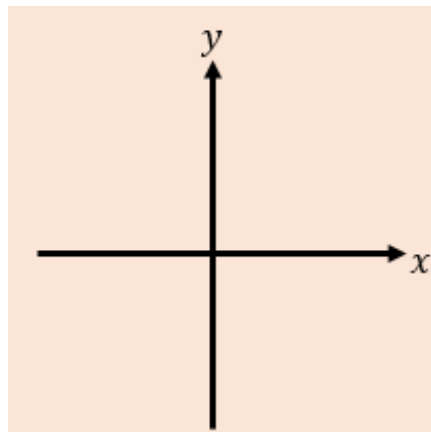
$$t(x) = 3|x - 1| - 2, x \in \mathbb{R}$$

a) Sketch the graph of the function



b) State the range of the function

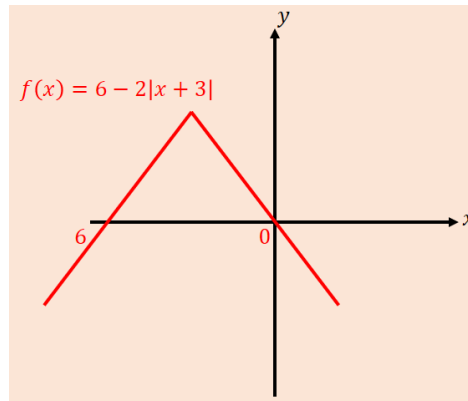
c) Solve the equation $t(x) = \frac{1}{2}x + 3$



2. The function f is defined by:

$$f: x \rightarrow 6 - 2|x + 3|$$

A sketch of the graph is shown.



a) State the range of f

b) Explain why f^{-1} does not exist

c) Solve the inequality $f(x) > 5$

