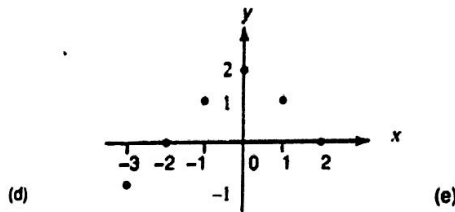
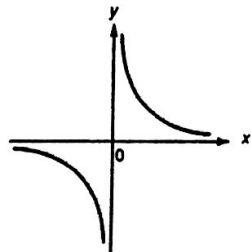
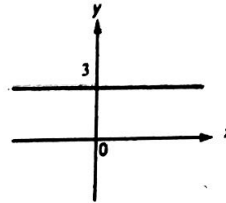
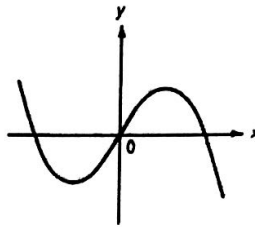
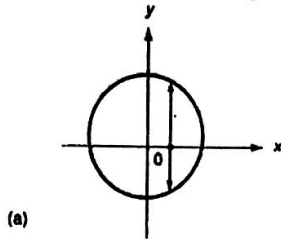


REVISION (ADDITIONAL MATHEMATICS)

CHAPTER 1: FUNCTIONS

1. Which of the following...



... are functions? **B, C, D, E**

... have an inverse? **D**

2. A function f is given by $f: x \rightarrow x^2 - x + 1$. Find:

(a) $f(2)$

$$f(2) = 4 - 2 + 1 = 3$$

(b) $f(-3)$

$$f(-3) = 9 + 3 + 1 = 13$$

(c) the image of -2

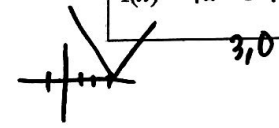
$$f(-2) = 4 + 2 + 1 = 7$$

(d) $f\left(\frac{x}{2}\right)$

$$f\left(\frac{x}{2}\right) = \frac{x^2}{4} - \frac{x}{2} + 1$$

3. State the domain and/or range of the following:

FUNCTION	DOMAIN	RANGE
$f(x) = \frac{1}{x+2}$	$x \neq -2$	$y \neq 0$
$f(x) = \sqrt{x-4}$	$x \geq 4$	$y \geq 0$
$f(x) = 2x^2 + 1$	$\{-2, -1, 0, 1, 2\}$	$\{9, 3, 1\}$
$f(x) = x^2 - 2$	$\{0, 1, -1, \pm 3, \dots\}$	$\{-2, -1, 7\}$
$f(x) = 4$	\mathbb{R}	4
$f(x) = x^2 - 3x + 2$ $(x-2)(x-1)$ 1, 2	$0 \leq x \leq 5$	$-\frac{1}{4} \leq y < 12$
$f(x) = x-3 $	$-1 \leq x < 3$	$0 < y \leq 4$



$$h(x+1) = \frac{x+2}{x}$$

4. A function h is given by $h(x) = \frac{x+1}{x-1}, x \neq 1$. Find $h(x+1)$.

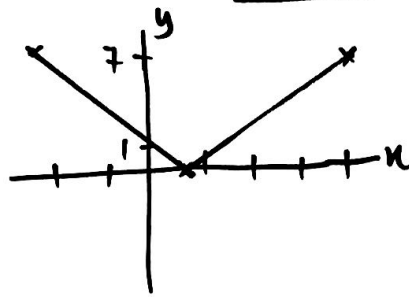
5. Given that $f(x) = x^2 + x - 1$, solve for x if $f(x) = 5$.

$$\begin{aligned} x^2 + x - 1 &= 5 \\ x^2 + x - 6 &= 0 \\ (x+3)(x-2) &= 0 \end{aligned}$$

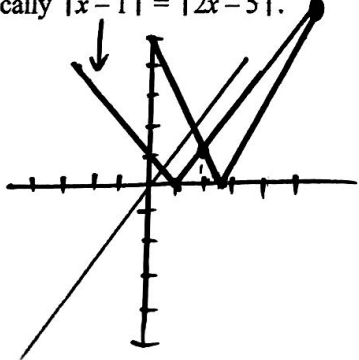
6. Sketch the graph of $y = |2x - 1|$ for the domain $-3 \leq x \leq 4$.

$$\frac{1}{2}, 0$$

$$x = 2, -3$$



7. Solve graphically $|x-1| = |2x-5|$.

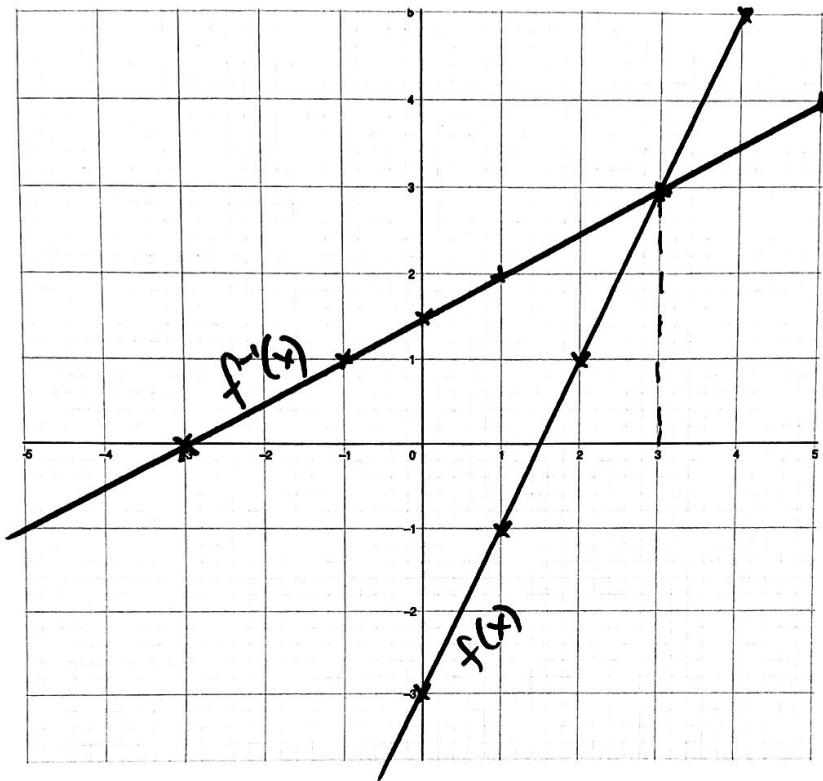


$$x = 2, 4$$

$$f^{-1}(x) = \frac{x+3}{2}$$

8. Given that $f(x) = 2x - 3$.

- Find $f^{-1}(x)$.
- Draw the graph of f and f^{-1} on the grid provided below.
- Solve $f(x) = f^{-1}(x)$.



9. Find the inverse of $h: x \rightarrow \frac{2x-1}{x-3}$, expressing your answer in the same form.

$$y = \frac{2x-1}{x-3}$$

10. Functions f and g are defined as:

$$f: x \rightarrow \frac{2}{x+1} \quad \text{and} \quad g: x \rightarrow 3x-2.$$

(a) Find:

- fg
- gf
- $(fg)^{-1}$
- $(gf)^{-1}$

(b) For what value of x is $gf = fg$.

$$fg(x) = \frac{2}{3x-1}$$

$$gf(x) = \frac{6}{x+1} - 2$$

$$xy - 3y = 2x - 1$$

$$xy - 2x = 3y - 1$$

$$x(y-2) = 3y-1$$

$$x = \frac{3y-1}{y-2}$$

$$\therefore h^{-1}(x) = \frac{3x-1}{x-2}$$

$$a(ax+b)+b$$

$$a^2x+ab+b = 9x-8$$

11. If $f(x) = ax + b$ and $f^2(x) = 9x - 8$, find the values of a and b .

$$a^2 = 9 \quad | \quad ab + b = -8$$

$$a = \pm 3$$

$a = 3$	$4b = 8$	$a = -3$
	$b = 2$	$b = 4$

12. If $f(x) = 2x - 5$, find a function g such that $fg(x) = 6x - 1$.

$$2(g(x)) - 5 = 6x - 1$$

$$\frac{2(g(x))}{2} = \frac{6x + 4}{2}$$

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

13. Given that $f(x) = x + 3$ and $g(x) = x^2$, express the following in terms of the functions f and g .

- | | |
|---------------------|-----------|
| (a) $x^2 + 3$ | fg |
| (b) $x^2 + 6x + 9$ | gf |
| (c) $x + 6$ | ff |
| (d) $x^2 + 6x + 12$ | fgf |
| (e) $x^2 - 6x + 9$ | gf^{-1} |

14. Solve: $|\frac{x-3}{2}| = 4$

$$|\frac{x-3}{2}| = 4$$

$x-3 = 8$	$x-3 = -8$
$x = 11$	$x = -5$

15. Solve: $|2x - 1| = 4 - x$

$$2x - 1 = 4 - x$$

$$3x = 5$$

$$x = \frac{5}{3}$$

$$2x - 1 = -4 + x$$

$$x = -4 + 1$$

$$x = -3$$