# FUNCTIONS AND GRAPHS

1) Given $f(x) = 5 - x^2$, find $f(-2)$ and $f(3)$

2) If $g(x) = 2x - 1$, find x when $g(x) = 5$

3) The function $f(x) = \begin{cases} x^2 & if \ x > 1 \\ 3x + 4 & if \ x \le 1 \end{cases}$

   Find (a) $f(0)$
   (b) $f(4)$
   (c) $f(-2)$
   (d) $f(1)$

4) The function $f(x) = \begin{cases} x^3 + 1 & if \ x > 2 \\ 2x & if \ -1 \le x \le 2 \\ 5 & if \ x < -1 \end{cases}$

   Find $f(-3) + f(0) - f(4) + f(2)$

5) Given $f(x) = x^2 - 5x$, find
   (a) $f(2)$
   (b) x when $f(x) = 6$

6) Sketch $3x - 2y - 6 = 0$ on a number plane.

7) (a) Sketch $f(x) = 2x + 3$ and $f(x) = x^2$ on the same set of axes.

   (b) Use your graphs to solve $x^2 = 2x + 3$.

8) Sketch $y = x^2 + x - 2$ on a number plane, and state its domain and range.

9) Find the $x-$ and $y-$intercepts of the curve $y = -x^2 + 6x - 8$. Sketch the curve.

10) Sketch $x^2 + y^2 = 9$. Is this graph a function? Why?

11) Sketch $y = -\sqrt{4 - x^2}$ on a number plane. What is the domain and range?

12) Sketch $f(x) = x^3$

13) Draw the graph of $y = |x + 1|$ and state its domain and range

14) What is the domain and range of $y = \sqrt{2x - 3}$?

15) Sketch $g(x) = 3^x$. What is its domain and range?

16) Find $\lim\limits_{x \to 2} \dfrac{x^2 - 4}{x - 2}$

17) Is the graph $y = \dfrac{3}{x - 1}$ continuous? What is its domain?

18) Sketch $f(x) = -\dfrac{1}{x}$.

19) Sketch $y = \dfrac{3}{x + 2}$ on a number plane.

20) Describe the locus of a point that is always 3 units from the origin.

21) Shade the region where $y \ge 2x - 3$.

22) Shade the region given by $x^2 + y^2 < 1$.

23) Shade the region where $y < x$ and $y \le 2$

24) Sketch $y = x + 1$ and $y = x - 3$ on the same set of axes.
   (a) Shade the region $y \ge x + 1$.
   (b) What inequations would describe the region between the two lines?

ANSWERS

1) $f(-2) = 1, f(3) = -4$
2) $x = 3$
3) (a) $f(0) = 4$ (b) $f(4) = 16$ (c) $f(-2) = -2$ (d) $f(1) = 7$
4) -56
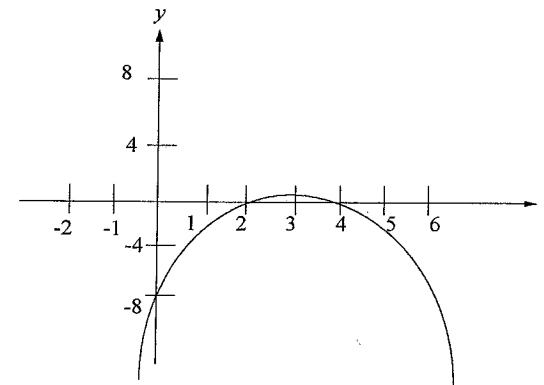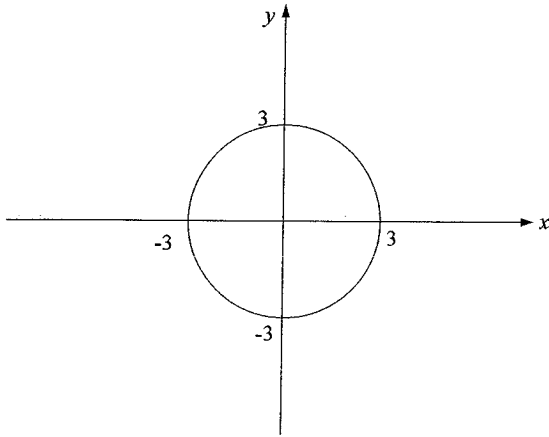5) (a) $f(2) = -6$ (b) $x = -1, 6$
6)
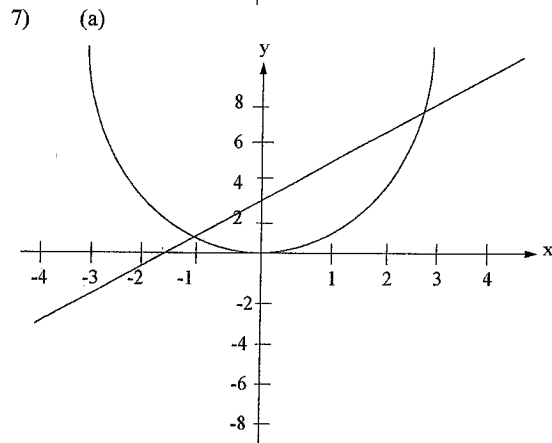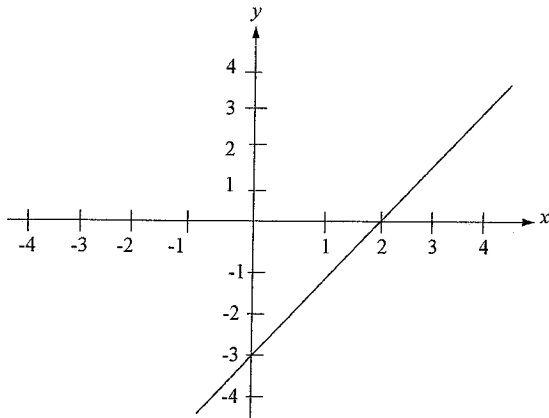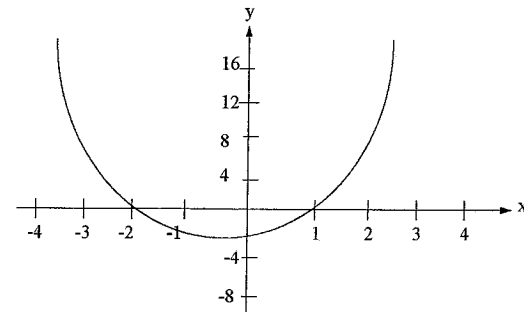
Domain: all real x. Range: $y \geq -2\frac{1}{4}$

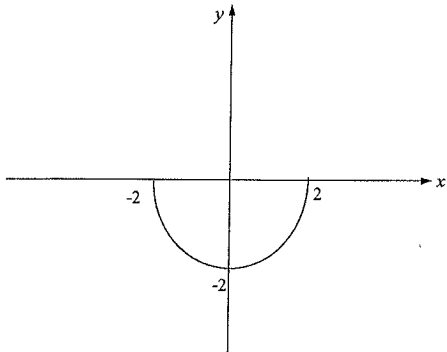9) x-intercepts 2,4 y-intercept -8
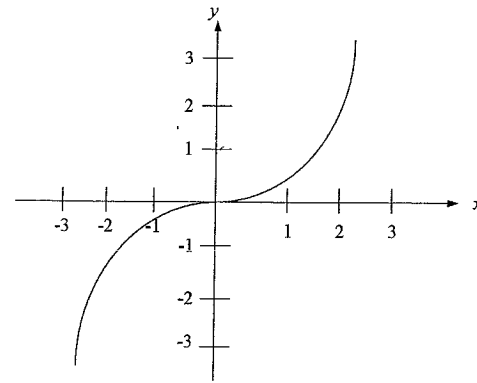
7) (a)

(b) $x = -1, 3$

8)

10)

This is not a function (vertical line cuts the graph more than once - there is more than one y value for any x value)
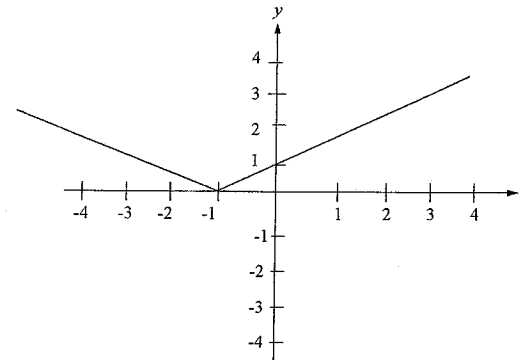
11)

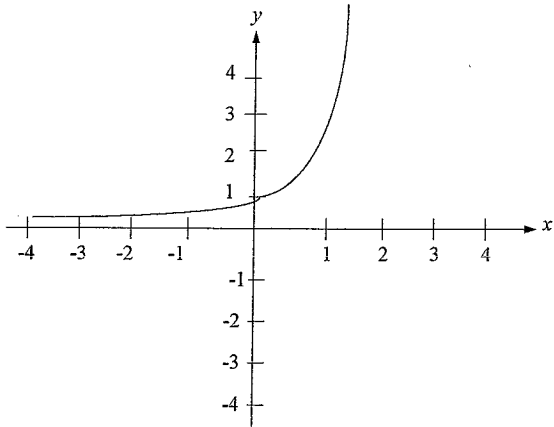
Domain: $-2 \leq x \leq 2$. Range: $-2 \leq y \leq 0$

12)

13)

Domain: all real x. Range: $y \geq 0$

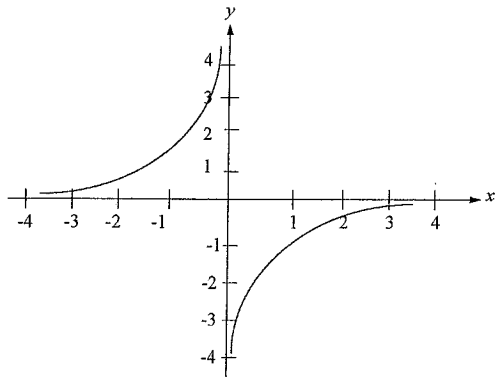14)   Domain: $x \geq 1\frac{1}{2}$. Range: $y \geq 0$.
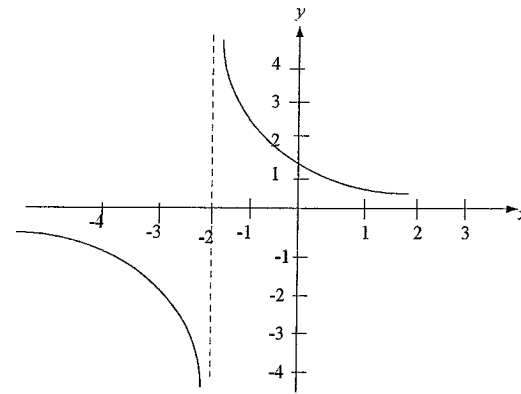
15)

Domain: all real x. Range: $y > 0$

16)   4

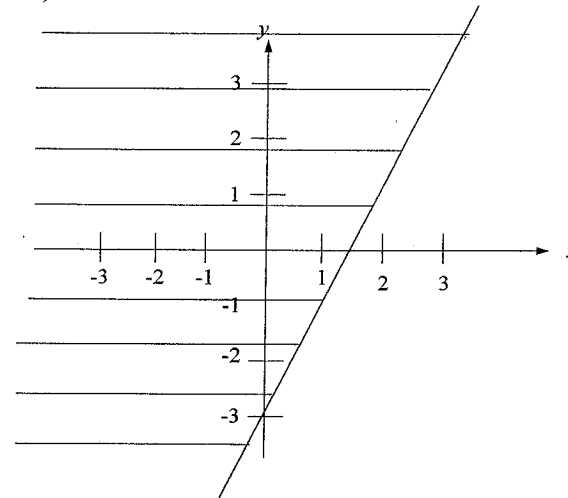17)   No, it is discontinuous at $x = 1$. Domain is all real $x \neq 1$
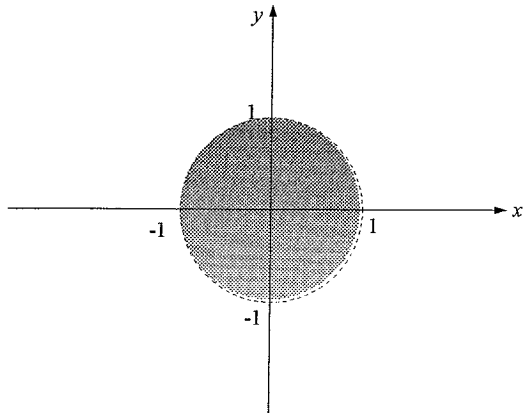
18)

19)

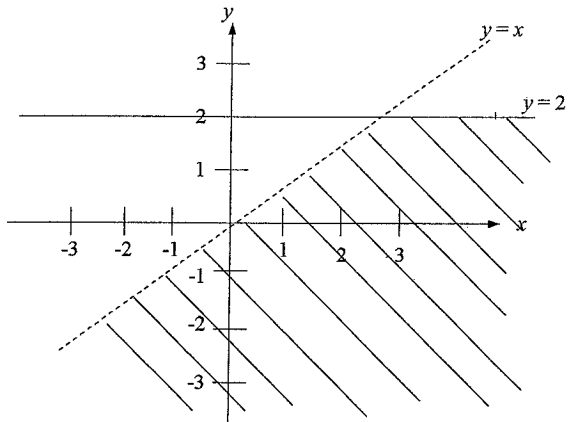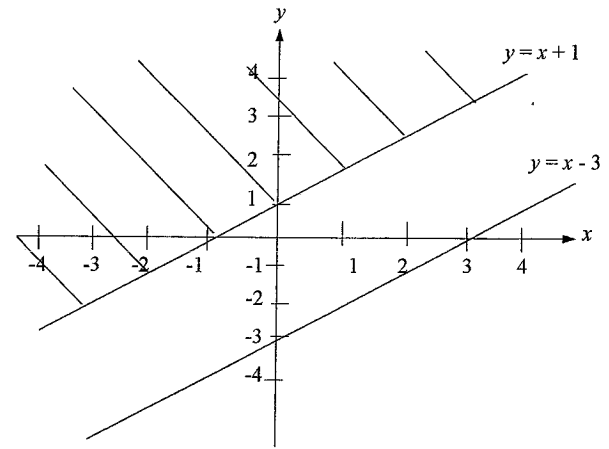20)   This is a circle with radius 3 and centre the origin.

21)

22)

23)

(b) $y < x + 1, y > x - 3$ or $x - 3 < y < x + 1$

24)   (a)