1. (i) On the same set of axes, sketch the graphs of $y = x$ and $y = -\dfrac{1}{x}$.

(ii) By addition of ordinates, sketch the graph of $y = x - \dfrac{1}{x}$.

(Sketch all graphs on the above set of axes).

2. Sketch the following by addition of ordinates:

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

(b) $y = \dfrac{3}{x} - 2x$

(c) $y = x^2 + \dfrac{1}{x}$

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

(e) $y = 2^x + 2^{-x}$

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

3. (a) Prove that $y = \sqrt{x+1} + \sqrt{1-x}$ is an even function.

(b) Find the domain of this function.

(c) Find the value of y when $x = 0$.

(d) Use the information gleaned in parts (a), (b) and (c), and the method of addition of ordinates to sketch this function, stating also its range.

4.   Sketch the following graphs of reciprocal functions, stating the domain and range :

(a) $y = \operatorname{cosec} x$, $0 \le x \le 360°$

(b) $y = \cot x$, $0 \le x \le 360°$

(c) $y = \dfrac{2}{x^2 + 1}$

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

(e) $y = \dfrac{1}{x^3 - x}$

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

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

(h) $y = \dfrac{1}{\sqrt{4 - x^2}}$

5. Sketch the following rational functions:

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

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

(c) $y = \dfrac{2}{(x-3)(x+2)}$
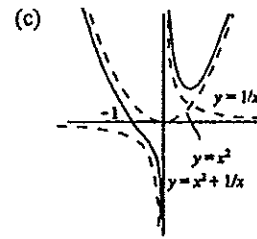
(d) $y = \dfrac{1}{x^2+x}$

(e) $y = \dfrac{x+1}{(x-1)(x+2)}$

(f) $y = \dfrac{x^2-4}{x^2+2x-3}$

ANSWERS:

1.

2. (a) $y = 2x + 1/x$ **(b)** **(c)**

(d) $y = x^2$, $y = x^2 - \dfrac{1}{x}$, $y = -\dfrac{1}{x}$ **(e)** $y = 2^x + 2^{-x}$, $y = 2^{-x}$, $y = 2^x$ **(f)** $y = 2^x$, $y = 2^x - 2^{-x}$, $y = -2^{-x}$

3. (b) $-1 \le x \le 1$ **(c)** 2

(d)
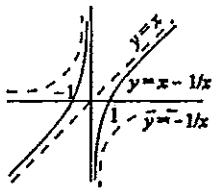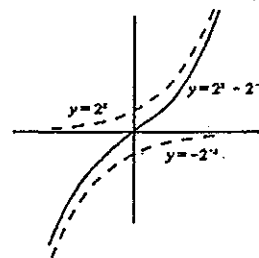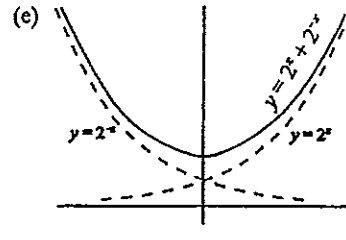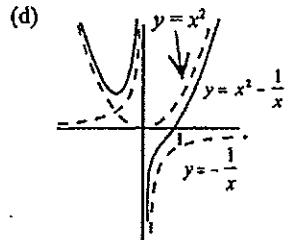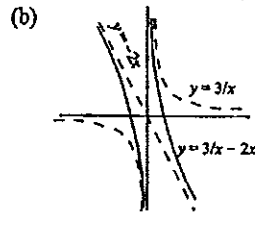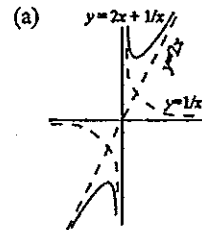
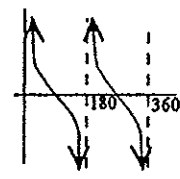$y = \sqrt{x+1} + \sqrt{1-x}$, $y = \sqrt{1-x}$, $y = \sqrt{x+1}$
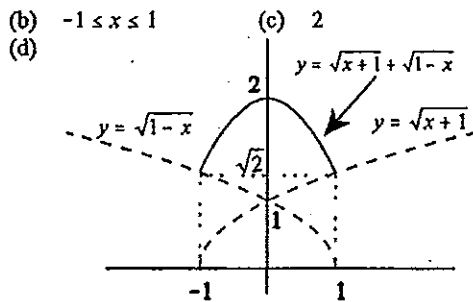
Range: $\sqrt{2} \le y \le 2$

4. (a)
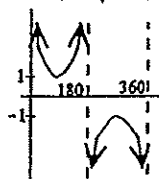
D: $0 < x < 360, x \ne 180$
R: $y \le -1, y \ge 1$

(b)

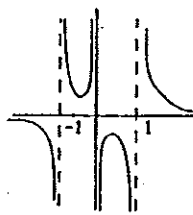D: $0 < x < 360, x \ne 180$
R: all real y

(c)
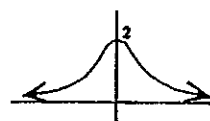
D: all real x
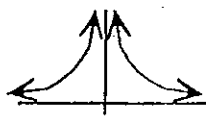R: $y > 0$

(d)
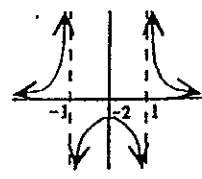
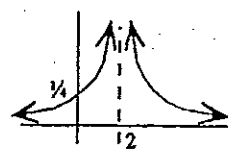D: $x \ne \pm 1$
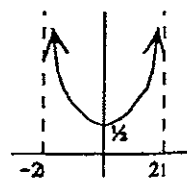R: $y \le -2, y > 0$

(e)

D: $x \ne 0, \pm 1$
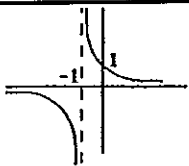R: $y \ne 0$

(f)

D: $x \ne 0$
R: $y > 0$

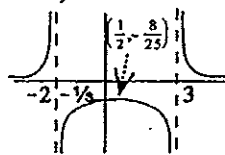**(g)**

D: $x \ne 2$
R: $y > 0$

(h)

D: $-2 < x < 2$
R: $y \ge \frac{1}{2}$

5. (a)

(b)

(c)

(d)

(e)

(f)