

Functions

Problem Set 6

1. Describe the following functions in words.

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

(b) $f(x) = (x + 1)^2$

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

2. Consider the function $f(t) = t^2 + t$. Evaluate

(a) $f(-2)$

(b) $f(0)$

(c) $f\left(\frac{1}{2}\right)$

3. Find the domain and range of $f(x) = \sqrt{x - 2}$.

4. Find the domains of the following functions.

(a) $g(x) = \sqrt{x + 5}$

(b) $h(x) = \sqrt{2x - 7}$

(c) $f(x) = \frac{1}{x - 3}$

(d) $f(x) = \frac{1}{\sqrt{x - 3}}$

(e) $f(x) = \frac{1}{(x + 1)(x + 3)}$

(f) $g(x) = \frac{1}{x^2 + x - 6}$

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

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

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

(j) $g(x) = \sqrt{27 - 3x^2}$

(k) $f(x) = \sqrt{2x - 1} + \sqrt{x + 5}$

5. Sketch the graphs of the following functions by starting with the standard function and applying transformations.

(a) $f(x) = \sqrt{x} + 2$

(b) $f(x) = \sqrt{x + 4} - 5$

(c) $f(x) = 3|x + 4| - 1$

(d) $f(x) = 2 - (x + 1)^3$

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

6. Rearrange the equation $f(x) = \frac{x + 5}{x + 2}$ to write it as a modification on a rectangular hyperbola, and then sketch the graph of this function.

7. Let $f(x) = x^2 - 1$. Sketch the following modification of $f(x)$.

(a) $f(x) - 2$

(b) $2 - f(x)$

(c) $f(x - 2)$

(d) $|f(x)|$

8. Write down the equation of the circle given the following details and sketch its graph.

(a) Centre (2,3) and Radius 5.

(b) Centre (-1,-2) and Radius 2.

9. Write down the centre and radius given the following equations of a circle.

(a) $(x - 7)^2 + (y + 5)^2 = 16$

(b) $(x + 1)^2 + y^2 = 3$

(c) $(x - 1)^2 + (y - 1)^2 = 1$

(d) $y^2 = 4 - x^2$

(e) $x^2 - 6x + y^2 = 10$

(f) $x^2 + 10x + y^2 + 2y - 3 = 0$