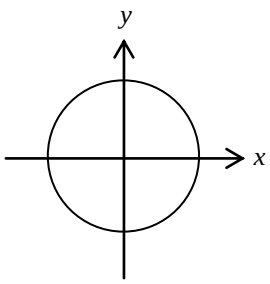
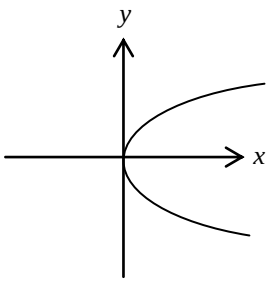
Year 11 Extension 1 **Real Functions Assignment** **Date Due:**

1. Decide whether each of the following is a function (F) or a relation (R).

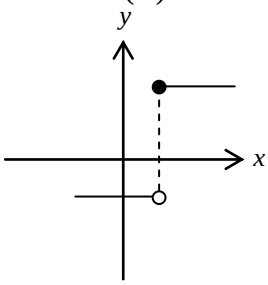
(a)



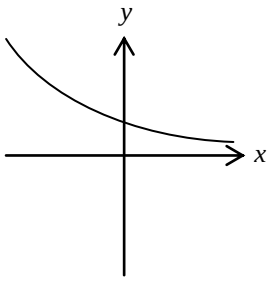
(b)



(c)



(d)



2. Draw separate sketches, not on graph paper, of:

(a) $y = \sqrt{9 - x^2}$ (b) $y = x^2 - 1$ (c) $y = (x - 1)^2$

(d) $y = \dfrac{1}{x - 1}$ (e) $y = |x - 3|$ (f) $y = -2^{-x}$

(g) $y = \begin{cases} x + 3, & x \le 2 \\ 7 - x, & x > 2 \end{cases}$ (h) $y = \begin{cases} 2x^2, & x \le 1 \\ 3 - x, & x > 1 \end{cases}$

3. State the domain and range for:

(a) $y = x^2 + 5$ (b) $y = -\sqrt{4 - x^2}$ (c) $y = \dfrac{1}{x - 3}$

(d) $y = 3x + 4$ (e) $y = \sqrt{x - 1}$ (f) $y = x^2 + 2x - 3$

4. Determine whether $y = x^5 - x$ is odd, even or neither. You must show working.

5. If $G(x) = 2x^3 + x$, find the value of $G(-4)$.

6. If $H(x) = \begin{cases} ax + 1, & x \le 1 \\ x^2 - 5, & x > 1 \end{cases}$ and $H(-2) = H(4)$, find the value of a.

7. Write down the equations of the circles: (a) centre (0, 0) and radius 6 units

(b) centre (–4, 1) and radius 8 units

8. Find the centre and radius of the circle $x^2 + y^2 - 14x + 4y + 28 = 0$

9. Describe, algebraically, the locus of the points $P(x, y)$ which are:

(i) 2 units from A(–2, 1) (ii) 3 units from the x-axis

(iii) equidistant from the points Q(5, 8) and R(–1, 2)

(iv) equidistant from the point S(0, 3) and the line $y = -3$

10. On the same number plane, shade the region where $x^2 + y^2 < 9$, $x \ge 1$ and $y > -1$ hold simultaneously.