3. A function f is defined by $f(x) = 2x - 5$. Write down the values of
(i) $f(0)$, (ii) $f(7)$, (iii) $f(-3)$.

Sol. $f(x) = 2x - 5$
(i) $f(0) = 2 \times 0 - 5 = -5$.
(ii) $f(7) = 2 \times 7 - 5 = 14 - 5 = 9$.
(iii) $f(-3) = 2 \times (-3) - 5 = -6 - 5 = -11$.

4. The function 't' maps temperature in Celsius into temperature in degree Fahrenheit is defined by $t(C) = \frac{9C}{5} + 32$.

Find (i) $t(0)$ (ii) $t(28)$
(iii) $t(-10)$ (iv) The value of C, when $t(C) = 212$.

Sol. $t(C) = \frac{9C}{5} + 32$

(i) When $C = 0, t(0) = 0 + 32 = 32$.

(ii) $t(C) = \frac{9C}{5} + 32$

When $C = 28$,

$$t(28) = \frac{9 \times 28}{5} + 32 = \frac{252}{5} + 32 = \frac{252 + 160}{5} = \frac{412}{5}.$$

(iii) When $C = -10$

$$t(-10) = (-10)\frac{9}{5} + 32 = -18 + 32 = 14.$$

(iv) $t(C) = 212 \Rightarrow 212 = \frac{9C}{5} + 32$

or $\frac{9C}{5} = 212 - 32 = 180$

or $C = \frac{180 \times 5}{9} = 100$.

5. Find the range of each of the following functions.
(i) $f(x) = 2 - 3x, x \in R, x > 0$.
(ii) $f(x) = x^2 + 2$, x is a real number.
(iii) $f(x) = x$, x is a real number.

(ii) {(2, 1), (4, 2), (6, 3), (8, 4), (10, 5), (12, 6), (14, 7)}.

(iii) {1, 3}, {1, 5}, {2, 5}

Sol. (i) We have : $f = \{(2, 1), (5, 1), (8, 1), (11, 1), (14, 1), (17, 1)\}$

No two ordered pairs have the same first component. Therefore, this relation is a function.

Domain $(f) = \{2, 5, 8, 11, 14, 17\}$

Range $(f) = \{1\}$

(ii) We have : $f = \{(2, 1), (4, 2), (6, 3), (8, 4), (10, 5), (12, 6), (14, 7)\}$

We observe that no two ordered pairs have the same first component. So, f is a function.

Domain $(f) = \{2, 4, 6, 8, 10, 12, 14\}$.

Range $(f) = \{1, 2, 3, 4, 5, 6, 7\}$.

(iii) $f = (1, 3), (1, 5), (2, 5)$

We observe that 1 has appeared more than once as first component of the ordered pairs in f.

Therefore, f is not a function.

2. Find the domain and range of the following functions :

(i) $f(x) = -|x|$ (ii) $f(x) = \sqrt{9 - x^2}$

Sol. (i) $f(x) = -|x|, f(x) \leq 0, \forall x \in R$

Domain of $f = R$

Range of $f = \{y \in R, y \leq 0\}$

(ii) $f(x) = \sqrt{9 - x^2}$

Here, f is not defined for $9 - x^2 < 0$ or $x^2 > 9$ or when $x > 3$ or $x < -3$.

Also, for each real number x lying between -3 and 3 or for $x = -3, 3$; $f(x)$ is unique.

$\therefore$ Domain $(f) = \{x : x \in R \text{ and } -3 \leq x \leq 3\}$

Further, $y = \sqrt{9 - x^2}$ or $y^2 = 9 - x^2$.

or $x = \sqrt{9 - y^2}$.

Again, x is not defined for $9 - y^2 < 0$ or $y^2 > 9$ or $y > 3$ or $y < -3$.

But y cannot be –ve.

$\therefore$ Range $(f) = \{y : y \in R \text{ and } 0 \leq y \leq 3\}$