Simultaneous Eqns : 1 : Answers

1) $y = 4x + 1 \quad -①$
$y = x^2 + 8x + 4 \quad -②$

sub ① into ②

$4x + 1 = x^2 + 8x + 4$
$0 = x^2 + 4x + 3$
$0 = (x+3)(x+1)$

either $x + 3 = 0$ or $x + 1 = 0$
$x = -3$ $x = -1$

from ①

$y = 4(-3) + 1$
$y = -12 + 1$
$y = -11$

$y = 4(-1) + 1$
$y = -4 + 1$
$y = -3$

$\therefore x = -3, y = -11$ } ANS

$x = -1, y = -3$ } ANS

2) $y + x = x^2 \quad -①$
$y - 6 = 4x \quad -②$

② $\Rightarrow y = 4x + 6 \quad (*)$

sub into ①

$4x + 6 + x = x^2$
$0 = x^2 - 5x - 6$
$0 = (x-6)(x+1)$

either $x - 6 = 0$ or $x + 1 = 0$
$x = 6$ $x = -1$

from (*)

$y = 4(6) + 6$
$y = 24 + 6$
$y = 30$

$y = 4(-1) + 6$
$y = -4 + 6$
$y = 2$

$x = 6, y = 30$ } ANS

$x = -1, y = 2$ } ANS

3) $y - 10 = x^2 + 3x$ — (1)

$y - 7 = 7x$ — (2)

(2) $\Rightarrow$ $y = 7x + 7$ (*)

sub into (1)

$7x + 7 - 10 = x^2 + 3x$

$0 = x^2 - 4x + 3$

$0 = (x-3)(x-1)$

either $x - 3 = 0$ or $x - 1 = 0$

$x = 3$ $x = 1$

from (*)

$y = 7(3) + 7$ $y = 7(1) + 7$

$y = 21 + 7$ $y = 7 + 7$

$y = 28$ $y = 14$

$x = 3$, $y = 28$ } ANS $x = 1$, $y = 14$ } ANS

4) $x^2 + y^2 = 34$ — (1)

$y = x + 2$ — (2)

sub (2) into (1)

$x^2 + (x+2)^2 = 34$

$x^2 + x^2 + 4x + 4 = 34$

$2x^2 + 4x - 30 = 0$

$x^2 + 2x - 15 = 0$

$(x+5)(x-3) = 0$

either $x + 5 = 0$ or $x - 3 = 0$

$x = -5$ $x = 3$

from (2)

$y = -5 + 2$ $y = 3 + 2$

$y = -3$ $y = 5$

$x = -5$, $y = -3$ } ANS $x = 3$, $y = 5$ } ANS.

6) $x^2 + y^2 = 85$ — ①
$4x + y = 17$ — ②

② ⇒ $y = 17 - 4x$ (*)

① ⇒ $x^2 + (17-4x)^2 = 85$
$x^2 + 289 - 136x + 16x^2 = 85$

$17x^2 - 136x + 204 = 0$
÷17 $x^2 - 8x + 12 = 0$
$(x-6)(x-2) = 0$
either $x-6=0$ or $x-2=0$
$x = 6$ $x = 2$

from (*) ↓ ↓

$y = 17-4(6)$ $y = 17-4(2)$
$y = 17-24$ $y = 17-8$
$y = -7$ $y = 9$

$x = 6$, $y = -7$ } ANS $x = 2$, $y = 9$ } ANS

WRONG ORDER

↑

↓

6) $x^2 + y^2 = 85$ — ①
$4x + y = 17$ — ②
② ⇒ $y = 17 - 4x$

5) $x^2 + y^2 = 25$ — ①
$3x - 5 - y = 0$ — ②

② ⇒ $3x - 5 = y$ (*)

① ⇒ $x^2 + (3x-5)^2 = 25$
$x^2 + 9x^2 - 30x + 25 = 25$
$10x^2 - 30x = 0$
$x^2 - 3x = 0$
$x(x-3) = 0$
either
$x = 0$ or $x - 3 = 0$
from (*) ↓ $x = 3$

$y = 3(0) - 5$ $y = 3(3) - 5$
$y = -5$ $y = 9 - 5 = 4$

$x = 0$, $y = -5$ } ANS $x = 3$, $y = 4$ } ANS

7) $y + 2x = 4$ — ①
$y = x^2 + x$ — ②

① $\Rightarrow$ $y = 4 - 2x$ (*)

② $\Rightarrow$ $4 - 2x = x^2 + x$
$0 = x^2 + 3x - 4$
$0 = (x+4)(x-1)$

either $x + 4 = 0$ or $x - 1 = 0$
$x = -4$ $x = 1$

from (*) ↓ ↓

$y = 4 - 2(-4)$ $y = 4 - 2(1)$
$y = 4 + 8$ $y = 4 - 2$
$y = 12$ $y = 2$

$x = -4$, $y = 12$ } ANS $x = 1$, $y = 2$ } ANS

8) $x = 2y$ — ①
$x^2 - y^2 + xy = 20$ — ②

sub ① into ②

$(2y)^2 - y^2 + xy = 20$
$4y^2 - y^2 + (2)y = 20$
$3y^2 + 2y^2 = 20$

$5y^2 = 20$
$y^2 = 4$
$y^2 - 4 = 0$
$(y+2)(y-2) = 0$

either $y + 2 = 0$ or $y - 2 = 0$
$y = -2$ $y = 2$

From ① ↓ ↓

$x = 2(-2)$ $x = 2(2)$
$x = -4$ $x = 4$

$x = -4$, $y = -2$ } ANS $x = 4$, $y = 2$ } ANS

9) $x + 2y = -3$ — (1)

$x^2 - 2x + 3y^2 = 11$ — (2)

(1) $\Rightarrow$ $x = -3 - 2y$ (*)

Sub into (2)

$(-3-2y)^2 - 2(-3-2y) + 3y^2 = 11$

$9 + 12y + 4y^2 + 6 + 4y + 3y^2 = 11$

$7y^2 + 16y + 4 = 0$

$(7y + 2)(y + 2) = 0$

either

$7y + 2 = 0$ or $y + 2 = 0$

$y = -2/7$ $y = -2$

from (*) ↓ ↓

$x = -3 - 2(-2/7)$ $x = -3 - 2(-2)$

$x = 3 + \frac{4}{7}$ $x = -3 + 4$

$x = \frac{25}{7}$ $x = 1$

$x = \frac{25}{7}$, $y = -\frac{2}{7}$ } ANS $x = 1$, $y = -2$ } ANS.

10) $y - 4 = x$ — (1)

$y + x^2 = 4$ — (2)

(1) $\Rightarrow$ $y = x + 4$ (*)

sub into (2)

$x + 4 + x^2 = 4$

$x^2 + x = 0$

$x(x+1) = 0$

either or $x + 1 = 0$

$x = 0$ $x = -1$

from (*) ↓ ↓

$y = 0 + 4$ $y = -1 + 4$

$y = 4$ $y = 3$

$x = 0$, $y = 4$ } ANS $x = -1$, $y = 3$ } ANS.