1. Solve the simultaneous equations

$$x^2 + y^2 = 29 \quad (1)$$

$$y - x = 3$$

$$y = 3 + x$$

sub $y = 3 + x$ into (1)

$$x^2 + (3+x)^2 = 29$$

$$x^2 + 9 + 3x + 3x + x^2 = 29$$

$$2x^2 + 6x - 20 = 0$$

$$x^2 + 3x - 10 = 0$$

$$(x + 5)(x - 2) = 0$$

$x = -5$ $\quad$ $x = 2$

$y = 3 + (-5)$ $\quad$ $y = 3 + (2)$

$= -2$ $\quad$ $= 5$

$x = -5$ and $y = -2$ or $x = 2$ and $y = 5$

(Total 7 marks)

2. Bill said that the line $y = 6$ cuts the curve $x^2 + y^2 = 25$ at two points.

(a) By eliminating y show that Bill is incorrect.

$x^2 + (6)^2 = 25$

$x^2 + 36 = 25$

$x^2 = -9$

There are no solutions. (You can not square root a negative number)

(2)

(b) By eliminating y, find the solutions to the simultaneous equations

$$x^2 + y^2 = 25$$

$$y = 2x - 2$$

$x^2 + (2x-2)^2 = 25$

$x^2 + 4x^2 - 4x - 4x + 4 = 25$

$5x^2 - 8x - 21 = 0$

$(5x + 7)(x - 3) = 0$

$x = -\frac{7}{5}$ $\quad x = 3$

$y = 2\left(-\frac{7}{5}\right) - 2$ $\quad y = 2(3) - 2$

$= -\frac{14}{5} - 2$ $\quad y = 6 - 2$

$= -\frac{24}{5}$ $\quad = 4$

$x =$ $-7/5$ $y =$ $-24/5$

or $x =$ 3 $y =$ 4

(6)

(Total 8 marks)

3. By eliminating y, find the solutions to the simultaneous equations

$$x^2 + y^2 = 25$$
$$y = x - 7$$

$x^2 + (x-7)^2 = 25$

$x^2 + x^2 - 7x - 7x + 49 = 25$

$2x^2 - 14x + 24 = 0$

$x^2 - 7x + 12 = 0$

$(x-3)(x-4) = 0$

$x = 3 \quad x = 4$

$y = (3) - 7 \quad y = (4) - 7$

$= -4 \quad = -3$

$x =$ 3 $y =$ −4

or $x =$ 4 $y =$ −3

(Total 6 marks)

4. By eliminating y, find the solutions to the simultaneous equations

$$y - 2x = 3$$

$$x^2 + y^2 = 18$$

$y = 2x + 3$

$x^2 + (2x+3)^2 = 18$

$x^2 + 4x^2 + 6x + 6x + 9 = 18$

$5x^2 + 12x + 9 = 0$

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

$x = \frac{3}{5}$ $\quad x = -3$

$y = 2(\frac{3}{5}) + 3$ $\quad y = 2(-3) + 3$

$= \frac{6}{5} + 3$ $\quad y = -6 + 3$

$= \frac{21}{5}$ $\quad = -3$

$x =$ 3/5 $y =$ 21/5

or $x =$ -3 $y =$ -3

(Total 7 marks)

5. Solve the simultaneous equations

$x^2 + y^2 = 5$

$y = 3x + 1$

$x^2 + (3x+1)^2 = 5$

$x^2 + 9x^2 + 6x + 1 = 5$

$10x^2 + 6x - 4 = 0$

$5x^2 + 3x - 2 = 0$

$(5x - 2)(x + 1) = 0$

$x = \frac{2}{5}$ $x = -1$

$y = 3(\frac{2}{5}) + 1$ $y = 3(-1) + 1$

$= \frac{6}{5} + 1$ $= -3 + 1$

$= \frac{11}{5}$ $= -2$

$x =$ 2/5 ..... $y =$ 11/5 .....

or $x =$ −1 ..... $y =$ −2 .....

(Total 6 marks)

6. Solve the simultaneous equations

$x + y = 4$ $\quad y = 4 - x$

$x^2 + y^2 = 40$

$x^2 + (4 - x)^2 = 40$

$x^2 + 16 - 8x + x^2 = 40$

$2x^2 - 8x - 24 = 0$

$x^2 - 4x - 12 = 0$

$(x - 6)(x + 2) = 0$

$x = 6$ $\quad x = -2$.

$y = -2$ $\quad y = 6$

$x =$ 6 , $y =$ −2

or

$x =$ −2 , $y =$ 6

(Total 7 marks)

7. By eliminating x, find the solutions to the simultaneous equations

$$x - 2y = 1$$
$$x^2 + y^2 = 13$$

$x = 2y + 1$

$(2y+1)^2 + y^2 = 13$

$4y^2 + 4y + 1 + y^2 = 13$

$5y^2 + 4y - 12 = 0$

$(5y - 6)(y + 2) = 0$

$y = \frac{6}{5}$ $\quad y = -2$

$x = 2\left(\frac{6}{5}\right) + 1$

$= \frac{12}{5} + 1$

$= \frac{17}{5}$

$x = 2(-2) + 1$

$= -4 + 1$

$= -3$

$x = \frac{17}{5}$, $y = \frac{6}{5}$

or $x = -3$, $y = -2$

(Total 7 marks)