

①

Bonus Assignment

Systems of Equations

MATH 171

SECTION 5.4

30 $3x + 2y = 4$ ①
 $6x - 6y = 13$ ②

Isolate x in ② $6x = 13 + 6y$
 $x = \frac{13}{6} + y$

sub in ①

$$3x + 2y = 4$$
$$3\left(\frac{13}{6} + y\right) + 2y = 4$$

$$\frac{13}{2} + 3y + 2y = 4$$

$$5y = 4 - \frac{13}{2}$$

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

$$y = -\frac{1}{2}$$

sub in ①

$$3x + 2y = 4$$

$$3x + 2\left(-\frac{1}{2}\right) = 4$$

$$3x - 1 = 4$$

$$3x = 5$$

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

So $(x, y) = \left(\frac{5}{3}, -\frac{1}{2}\right)$

32 $1 + 6q = 5p$ ①
 $3p - 4q = 7$ ②

isolate q in ①
 $6q = 5p - 1$
 $q = \frac{5}{6}p - \frac{1}{6}$

sub in ②
 $3p - 4\left(\frac{5}{6}p - \frac{1}{6}\right) = 7$
 $3p - \frac{20}{6}p + \frac{4}{6} = 7$
 $-\frac{1}{3}p = 7 - \frac{4}{6}$
 $-\frac{1}{3}p = \frac{19}{3}$
 $p = -19$

sub in ②
 $3(-19) - 4q = 7$
 $-57 - 4q = 7$
 $-4q = 64$
 $q = -16$

solution $(p, q) = (-19, -16)$

34 $2x + 6y = -3$
 $-6x - 18y = 5$

isolate x in ①
 $2x = -3 - 6y$
 $x = -\frac{3}{2} - 3y$

sub in ②
 $-6\left(-\frac{3}{2} - 3y\right) - 18y = 5$
 $9 + 18y - 18y = 5$

$9 = 5$ impossible

no solution

(3)

$$\# 36 \quad 0.66x + 0.66y = -0.77 \quad (1)$$

$$0.33x - 1.32y = 1.43 \quad (2)$$

Isolate x in (2)

$$0.33x = 1.43 + 1.32y$$

$$x = \frac{1.43}{0.33} + \frac{1.32y}{0.33}$$

Sub in (1)

$$0.66\left(\frac{1.43}{0.33} + \frac{1.32}{0.33}y\right) + 0.66y = -0.77$$

$$2.86 + 2.64y + 0.66y = -0.77$$

$$3.3y = -3.63$$

$$y = -1.1$$

$$\text{Sub in (2)} \quad 0.33x - 1.32(-1.1) = 1.43$$

$$0.33x + 1.452 = 1.43$$

$$0.33x = 1.43 - 1.452$$

$$x = -0.07$$

$$(x, y) = (-0.07, -1.1)$$

SECTION 5.6

4

$$\begin{aligned} \#4 \quad x + y - z &= -3 \quad (1) \\ x + z &= 2 \quad (2) \\ 2x - y + 2z &= 3 \quad (3) \end{aligned}$$

isolate x in (2)

$$x = 2 - z$$

sub in (1) & (3)

$$\begin{aligned} (1) \quad 2(2-z) - y + 2z &= 3 \\ 4 - 2z - y + 2z &= 3 \\ -y &= -1 \quad (a) \\ y &= 1 \end{aligned}$$

sub (a) in (b)

$$\begin{aligned} 2z &= 5 + 1 \\ z &= 3 \end{aligned}$$

sub in (1)

$$x + y - z = -3$$

$$x + 1 - 3 = -3$$

$$x = -1$$

$$(1) \quad 2 - z + y - z = -3$$

$$2 - 2z + y = -3 \quad (b)$$

$$2z = 5 + y$$

$$\text{solution } (x, y, z) = (-1, 1, 3)$$

5

6

$$2x + y - z = 4 \quad (1)$$

$$4x - 3y - 2z = -2 \quad (2)$$

$$8x - 2y - 3z = 3 \quad (3)$$

isolate y in (1)

$$y = 4 + z - 2x$$

sub in (2) & (3)

(2)

$$4x - 3(4 + z - 2x) - 2z = -2$$

$$4x - 12 - 3z + 6x - 2z = -2$$

$$10x - 5z = 10 \quad (a)$$

$$2x - z = 2$$

(3)

$$8x - 2(4 + z - 2x) - 3z = 3$$

$$8x - 8 - 2z + 4x - 3z = 3$$

$$12x - 5z = 11 \quad (b)$$

iso. z in (a)

$$z = 2x - 2$$

sub in (b)

$$12x - 5(2x - 2) = 11$$

$$12x - 10x + 10 = 11$$

$$2x = 1$$

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

sub in (a)

$$2(\frac{1}{2}) - z = 2$$

$$-z = 1$$

$$z = -1$$

sub in (1)

$$2x + y - z = 4$$

$$2(\frac{1}{2}) + y + 1 = 4$$

$$y = 2$$

soln $(x, y, z) = (\frac{1}{2}, 2, -1)$

#8

$$3r + s - t = 2 \quad \textcircled{1}$$

$$r - 2s + t = 0 \quad \textcircled{2}$$

$$4r - s + t = 3 \quad \textcircled{3}$$

isol. r in ② $r = 2s - t$

sub in ①

$$3(2s - t) + s - t = 2$$

$$6s - 3t + s - t = 2$$

$$7s - 4t = 2 \quad \textcircled{a}$$

$$7s = 2 + 4t$$

in ③

$$4(2s - t) - s + t = 3$$

$$8s - 4t - s + t = 3$$

$$7s - 3t = 3 \quad \textcircled{b}$$

$$7s = 3 + 3t$$

$$2 + 4t = 3 + 3t$$

$$t = 1$$

$$7s = 2 + 4(1)$$

$$7s = 6$$

$$s = 6/7$$

in ①

$$3r + 6/7 - 1 = 2$$

$$3r = 3 - 6/7$$

$$3r = 15/7$$

$$r = 5/7$$

$(r, s, t) = (5/7, 6/7, 1)$

#10

$$2u + 2v + 3w = 0 \quad \textcircled{1}$$

$$3u + v + 4w = 21 \quad \textcircled{2}$$

$$-u - 3v + 7w = 15 \quad \textcircled{3}$$

isol. u in ③

$$u = -3v + 7w - 15$$

sub in ①

$$2(-3v + 7w - 15) + 2v + 3w = 0$$

$$-6v + 14w - 30 + 2v + 3w = 0$$

$$-4v + 17w = 30 \quad \textcircled{a}$$

sub in ②

$$3(-3v + 7w - 15) + v + 4w = 21$$

$$-9v + 21w - 45 + v + 4w = 21$$

$$-8v + 25w = 66 \quad \textcircled{b}$$

iso. v in ②

$$v = -\frac{30}{4} + \frac{17w}{4}$$

sub in b

$$-8\left(-\frac{30}{4} + \frac{17w}{4}\right) + 25w = 66$$

$$60 - 34w + 25w = 66$$

$$-9w = 6$$

$$w = -2/3$$

(7)

$$w = -\frac{2}{3}$$

$$v = -\frac{30}{4} + \frac{17w}{4}$$

$$\begin{aligned} v &= -\frac{30}{4} + \frac{17(-\frac{2}{3})}{4} \\ &= -\frac{31}{3} \end{aligned}$$

Sub in (3)

$$-u - 3v + 7w = 15$$

$$-u - 3\left(-\frac{31}{3}\right) + 7\left(-\frac{2}{3}\right) = 15$$

$$u = \frac{34}{3}$$

$$\text{Solution } (u, v, w) = \left(\frac{34}{3}, -\frac{31}{3}, -\frac{2}{3}\right).$$

