KEY

First Name:_____ Last Name:_____

L49 – FQ – 9.1 Substitution

Q1: Solve the system of equations using ***substitution***: *(4 marks)*

$y = 2x - 2$ $x + 3y + 8 = 0$ PICK 1 option!

Option #1: Solve $y = 2x - 2$ for y.

$y = 2x - 2$ → Plug into $x + 3y + 8 = 0$

$x + 3(2x - 2) + 8 = 0$

$x + 6x - 6 + 8 = 0$

$7x + 2 = 0$

$-2 \quad -2$

$7x = -2$

$\div 7 \quad \div 7$

$x = -\frac{2}{7}$ → Plug into either eqn.

$y = 2x - 2$

$y = 2(-\frac{2}{7}) - 2$

$y = -\frac{4}{7} - 2$

$y = -\frac{18}{7}$

Soln is $(-\frac{2}{7}, -\frac{18}{7})$

Option #2: Solve $y = 2x - 2$ for x.

$y = 2x - 2$

$+2 \quad +2$

$y + 2 = 2x$

$\div 2 \quad \div 2 \quad \div 2$

$\frac{1}{2}y + 1 = x$ → Plug into $x + 3y + 8 = 0$

$(\frac{1}{2}y + 1) + 3y + 8 = 0$

$\frac{7}{2}y + 9 = 0$

$-9 \quad -9$

$\frac{7}{2}y = -9$

$\div \frac{7}{2} \quad \div \frac{7}{2}$

$y = -\frac{18}{7}$ → Plug into either eqn.

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

$x = \frac{1}{2}(-\frac{18}{7}) + 1$

$x = -\frac{18}{14} + \frac{14}{14}$

$x = -\frac{4}{14}$, $x = -\frac{2}{7}$

Soln is $(-\frac{2}{7}, -\frac{18}{7})$

Option #3: Solve $x + 3y + 8 = 0$ for x.

$x + 3y + 8 = 0$

$-3y \quad -3y$

$x + 8 = -3y$

$-8 \quad -8$

$x = -3y - 8$ → Plug into $y = 2x - 2$

$y = 2(-3y - 8) - 2$

$y = -6y - 16 - 2$

$+6y \quad +6y$

$7y = -18$

$\div 7 \quad \div 7$

$y = -\frac{18}{7}$ → Plug into any eqn.

$x = -3y - 8$

$x = -3(-\frac{18}{7}) - 8$

$x = \frac{54}{7} - \frac{56}{7}$

$x = -\frac{2}{7}$

Soln is $(-\frac{2}{7}, -\frac{18}{7})$

Option #4: Solve $x + 3y + 8 = 0$ for y.

$x + 3y + 8 = 0$

$-x \quad -x$

$3y + 8 = -x$

$-8 \quad -8$

$3y = -x - 8$

$\div 3 \quad \div 3 \quad \div 3$

$y = -\frac{1}{3}x - \frac{8}{3}$ → Plug into $y = 2x - 2$

$(-\frac{1}{3}x - \frac{8}{3}) = 2x - 2$

$+\frac{1}{3}x \quad +\frac{1}{3}x$

$-\frac{8}{3} = \frac{7}{3}x - 2$

$+2 \quad +2$

$-\frac{2}{3} = \frac{7}{3}x$

$\div \frac{7}{3} \quad \div \frac{7}{3}$

$-\frac{2}{7} = x$ → Plug into any eqn.

$y = 2x - 2$

$y = 2(-\frac{2}{7}) - 2$

$y = -\frac{4}{7} - 2$

$y = -\frac{4}{7} - \frac{14}{7}$

$y = -\frac{18}{7}$

Soln is $(-\frac{2}{7}, -\frac{18}{7})$

KEY

Q2: Solve the system of equations using ***substitution***: *(4 marks)*

$x - 3y + 2 = 0$ $\qquad$ $2x + 3y - 5 = 0$ $\qquad$ Pick one option.

Option #1: Solve $x-3y+2=0$ for x

$x-3y+2=0$
$+3y \quad +3y$
$x+2=3y$
$-2 \quad -2$
$\boxed{x=3y-2}$

Plug into $2x+3y-5=0$
$2(3y-2)+3y-5=0$
$6y-4+3y-5=0$
$9y-9=0$
$+9 \quad +9$
$9y=9$
$\div 9 \quad \div 9$
$\boxed{y=1}$

Plug into any eqn.
$x=3y-2$
$x=3(1)-2$
$\boxed{x=1}$

$\boxed{\text{Soln is } (1,1)}$

Option #2: Solve $x-3y+2=0$ for y

$x-3y+2=0$
$+3y \quad +3y$
$x+2=3y$
$\div 3 \quad \div 3 \quad \div 3$
$\boxed{\frac{1}{3}x+\frac{2}{3}=y}$

Plug into $2x+3y-5=0$
$2x+3\left(\frac{1}{3}x+\frac{2}{3}\right)-5=0$
$2x+x+2-5=0$
$3x-3=0$
$+3 \quad +3$
$3x=3$
$\div 3 \quad \div 3$
$\boxed{x=1}$

Plug into any eqn.
$y=\frac{1}{3}x+\frac{2}{3}$
$y=\frac{1}{3}(1)+\frac{2}{3}$
$\boxed{y=1}$

$\boxed{\text{Soln is } (1,1)}$

Option #3: Solve $2x+3y-5=0$ for x

$2x+3y-5=0$
$-3y \quad -3y$
$2x-5=-3y$
$+5 \quad +5$
$2x=-3y+5$
$\div 2 \quad \div 2 \quad \div 2$
$\boxed{x=-\frac{3}{2}y+\frac{5}{2}}$

Plug into $x-3y+2=0$
$\left(-\frac{3}{2}y+\frac{5}{2}\right)-3y+2=0$
$-\frac{9}{2}y+\frac{9}{2}=0$
$-\frac{9}{2} \quad -\frac{9}{2}$
$-\frac{9}{2}y=-\frac{9}{2}$
$\div\left(-\frac{9}{2}\right) \quad \div\left(-\frac{9}{2}\right)$
$\boxed{y=1}$

Plug into any eqn.
$x=-\frac{3}{2}y+\frac{5}{2}$
$x=-\frac{3}{2}(1)+\frac{5}{2}$
$\boxed{x=1}$

$\boxed{\text{Soln is } (1,1)}$

Option #4: Solve $2x+3y-5=0$ for y

$2x+3y-5=0$
$-2x \quad -2x$
$3y-5=-2x$
$+5 \quad +5$
$3y=-2x+5$
$\div 3 \quad \div 3 \quad \div 3$
$\boxed{y=-\frac{2}{3}x+\frac{5}{3}}$

Plug into $x-3y+2=0$
$x-3\left(-\frac{2}{3}x+\frac{5}{3}\right)+2=0$
$x+2x-5+2=0$
$3x-3=0$
$+3 \quad +3$
$3x=3$
$\div 3 \quad \div 3$
$\boxed{x=1}$

Plug into any eqn.
$y=-\frac{2}{3}x+\frac{5}{3}$
$y=-\frac{2}{3}(1)+\frac{5}{3}$
$\boxed{y=1}$

$\boxed{\text{Soln is } (1,1)}$

MARKING:

Beginning	0.0 - 3.5
Progressing	4.0 - 5.5
Competent	6.0 - 7.5
Exemplary	8.0