# Topic 3 // Systems A

**1**

$x + 12y = 68$

$x = 8y - 12$

$(8y - 12) + 12y = 68$

$8y - 12 + 12y = 68$

$20y - 12 = 68$

$+12 \quad +12$

$\frac{20y}{20} = \frac{80}{20}$

$y = 4$

$x = 8(4) - 12$

$x = 32 - 12$

$x = 20$

$(20, 4)$

**2**

$3[r + s = -12]$

$2r - 3s = 6$

$3r + 3s = -36$

$\frac{5r}{5} = \frac{-30}{5}$

$r = -6$

$(-6) + s = -12$

$+6 \quad +6$

$s = -6$

$(-6, -6)$

**3**

$3x - 6y = -6$

$4x = 4 + 5y$

$-5y \quad -5y$

$4[3x - 6y = -6]$

$-3[4x - 5y = 4]$

$12x - 24y = -24$

$-12x + 15y = -12$

$\frac{-9y}{-9} = \frac{-36}{-9}$

$y = 4$

$3x - 6y = -6$

$3x - 6(4) = -6$

$3x - 24 = -6$

$+24 \quad +24$

$\frac{3x}{3} = \frac{18}{3}$

$x = 6$

$(6, 4)$

**4**

$3[2m + 4n = 10]$

$-2[3m + 5n = 11]$

$6m + 12n = 30$

$-6m - 10n = -22$

$\frac{2n}{2} = \frac{8}{2}$

$n = 4$

$2m + 4(4) = 10$

$2m + 16 = 10$

$-16 \quad -16$

$\frac{2m}{2} = \frac{-6}{2}$

$m = -3$

$(-3, 4)$

**5** $-2[3x + 2y = 10]$

$6x + 4y = 15$

$-6x - 4y = -20$

$0 = -5$

not true

**no solutions**

**6** $-1(x + 3y = 11)$

$x + 4y = 14$

$-x - 3y = -11$

$y = 3$

$x + 4y = 14$

$x + 4(3) = 14$

$x + 12 = 14$

$-12 \quad -12$

$x = 2$

**(2, 3)**

**7** $6k + 8b = 12$

$3k = -4b + 6$

$+4b \quad +4b$

$-2(3k + 4b = 6)$

$6k + 8b = 12$

$-6k - 8b = -12$

$0 = 0$

true

**∞ many solutions**

**8** $5x - y = 4 \rightarrow 5x - y = 4$

$-1(2x - y = 1) \rightarrow -2x + y = -1$

$3x = 3$

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

$x = 1$

$2x - y = 1$

$2(1) - y = 1$

$2 - y = 1$

$-2 \quad -2$

$(-1) -y = -1 (-1) \rightarrow y = 1$

**(1, 1)**

**9** $-1(5x+y=0)$

$5x+2y=30$

$-5x-y=0$

$y=30$

$5x+y=0$

$5x+(30)=0$

$5x+30=0$

$-30 \quad -30$

$\frac{5x}{5}=\frac{-30}{5}$

$x=-6$

$(-6,30)$

**10** $2x-3y=-1$

$3(3x+y=4)$

$9x+3y=12$

$2x-3y=-1$

$\frac{11x}{11}=\frac{11}{11}$

$x=1$

$2x-3y=-1$

$2(1)-3y=-1$

$2-3y=-1$

$-2 \quad -2$

$\frac{-3y}{-3}=\frac{-3}{-3}$ → $y=1$

$(1,1)$

**11** $-1(3x+2y=6)$

$3x+y=y$

$-y \ -3 \quad -y \ -3$

$3x-y=-3$

$-3x-2y=-6$

$-3y=-9$

$\frac{-3y}{-3}=\frac{-9}{-3}$

$y=3$

$3x+2y=6$

$3x+2(3)=6$

$3x+6=6$

$-6 \quad -6$

$\frac{3x}{3}=\frac{0}{3}$

$x=0$

$(0,3)$

**12** $5(3m+4n=-13)$

$-3(5m+6n=-19)$

$15m+20n=-65$

$-15m-18n=57$

$\frac{2n}{2}=\frac{-8}{2}$

$n=-4$

$3m+4n=-13$

$3m+4(-4)=-13$

$3m-16=-13$

$+16 \quad +16$

$\frac{3m}{3}=\frac{3}{3}$ → $m=1$

$(1,-4)$

$^{1}13 \times 5 = 65$

$^{2}19 \times 3 = 57$