CS 3010 HW#2

1. $3x_1 + 4x_2 + 3x_3 = 10$
$1x_1 + 5x_2 - 3x_3 = 7$
$6x_1 + 3x_2 + 7x_3 = 15$

$R1 \cdot \frac{-1}{3} + R2 \Rightarrow$
$R1 \cdot -2 + R3 \Rightarrow$

$$\begin{bmatrix} 3x_1 + 4x_2 + 3x_3 = 10 \\ 0x_1 + \frac{11}{3}x_2 - 4x_3 = \frac{11}{3} \\ 0x_1 - 5x_2 + 1x_3 = -5 \end{bmatrix}$$

$-\frac{15}{7} + \frac{21}{7} = \frac{11}{7}$

$-\frac{60}{11} + \frac{77}{11} = \frac{17}{11}$

$3x_1 + 4x_2 + 3x_3 = 10$
$R2 \cdot \frac{15}{11} + R3 \Rightarrow 0x_1 + \frac{11}{3}x_2 - 4x_3 = \frac{11}{3}$
$0x_1 + 0x_2 + \frac{17}{11}x_3 = 0$

Back Sub: $\frac{17}{11}x_3 = 0 \Rightarrow x_3 = 0$
$\frac{11}{3}x_2 - 4(0) = \frac{11}{3} \Rightarrow x_2 = 1$
$3x_1 + 4(1) + 3(0) = 10 \Rightarrow x_1 = 2$

$\boxed{x_1 = 2;\ x_2 = 1;\ x_3 = 0}$

2. $(\frac{3}{4})\ 3x_1 + 4x_2 + 3x_3 = 10$
$(\frac{1}{5})\ 1x_1 + 5x_2 - 3x_3 = 7$
$(\frac{6}{7})\ 6x_1 + 3x_2 + 7x_3 = 15$

SF: [4, 5, 7] Ind: [1, 2, 3]

$R1 \cdot -2 + R3 \Rightarrow 0x_1 - 5x_2 + 1x_3 = -5$
$R1 \cdot -6 + R3 \Rightarrow 0x_1 - 27x_2 + 25x_3 = -27$
$6x_1 + 3x_2 + 7x_3 = 15$

Ind: [3, 2, 1]

$0x_1 - 5x_2 + 1x_3 = -5$
$R_2 \cdot (\frac{-5}{27}) + R_1 \Rightarrow 0x_1 + 0x_2 + \frac{98}{27}x_3 = 0$
$6x_1 + 3x_2 + 7x_3 = 15$

Ind: [3, 1, 2]

Back Sub: $\frac{98}{27}x_1 = 0 \Rightarrow x_1 = 0$
$-5x_2 + 1(0) = -5 \Rightarrow x_2 = 1$
$6x_1 + 3(1) + 7(0) = 15 \Rightarrow x_1 = 2$

$\boxed{x_1 = 2;\ x_2 = 1;\ x_3 = 0}$