Name: Solutions

Use Gaussian elimination and back-substitution to solve the linear system $A\mathbf{x} = \mathbf{b}$ with

$$A = \begin{pmatrix} 1 & 2 & 1 \\ 1 & 3 & 2 \\ 3 & 8 & 6 \end{pmatrix} \quad \text{and} \quad \mathbf{b} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}.$$

$$\left(\begin{array}{ccc|c} \boxed{1} & 2 & 1 & 1 \\ 1 & 3 & 2 & 0 \\ 3 & 8 & 6 & 0 \end{array}\right)$$

$$\Rightarrow \left(\begin{array}{ccc|c} 1 & 2 & 1 & 1 \\ 0 & \boxed{1} & 1 & -1 \\ 0 & 2 & 3 & -3 \end{array}\right)$$

$$\Rightarrow \left(\begin{array}{ccc|c} 1 & 2 & 1 & 1 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 1 & -1 \end{array}\right)$$

$$\Rightarrow \boxed{x_3 = -1}$$

$$\Rightarrow x_2 + x_3 = -1 \Rightarrow \boxed{x_2 = 0}$$

$$\Rightarrow x_1 + 2x_2 + x_3 = 1 \Rightarrow \boxed{x_1 = 2}$$