Instructions. Show all work, with clear logical steps. No work or hard-to-follow work will lose points.

Problem 1. (3 points) Find the inverse of the matrix

$$A = \begin{bmatrix} -1 & 3 \\ 1 & 3 \end{bmatrix}$$

Solution.
$$A^{-1} = \frac{1}{(-1)(3) - (3)(1)} \begin{bmatrix} 3 & -3 \\ -1 & -1 \end{bmatrix} = \begin{bmatrix} -\frac{1}{2} & \frac{1}{2} \\ \frac{1}{6} & \frac{1}{6} \end{bmatrix}$$ □

Problem 2. (3 points) Is the following matrix invertible? Why or why not?

$$\begin{bmatrix} 2 & 3 & 4 \\ 0 & 3 & 1 \\ 1 & -1 & -1 \end{bmatrix}$$

Solution. The matrix is invertible since its determinant is equal to -13, which is not 0.   □

Problem 3. (3 points) Solve the following equation.

$$\begin{vmatrix} x - 3 & 3 \\ 6 & x + 4 \end{vmatrix} = 0$$

Solution.

$$\begin{aligned} 0 &= \begin{vmatrix} x - 3 & 3 \\ 6 & x + 4 \end{vmatrix} \\ &= (x - 3)(x + 4) - (6)(3) \\ &= x^2 + x - 12 - 18 \\ &= x^2 + x - 30 \\ &= (x + 6)(x - 5), \end{aligned}$$

so $x = 5, -6$.   □

Problem 4. (1 point) What is your favorite thing about MA 16020?