Math 261, Quiz 1

1. *(20 points)* Suppose a matrix A in $\mathrm{Mat}_{3\times 5}(\mathbf{Z}_2)$ has row reduced echelon form

$$B = \begin{pmatrix} 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}.$$

(a) If the first, third and fifth columns of A are as indicated below, find the remaining entries of A:

$$A = \begin{pmatrix} 0 & ? & 1 & ? & 1 \\ 1 & ? & 0 & ? & 1 \\ 1 & ? & 1 & ? & 1 \end{pmatrix}.$$

(b) Check (by row-reducing) that the row-reduced echelon form of the matrix A you found in (a) really is B.

(c) Write down a basis for the solution space in $(\mathbf{Z}_2)^5$ of the equation $Ax = 0$ where $x = (x_1, x_2, x_3, x_4, x_5)^{\mathrm{t}}$.