ANSWERS TO SELECTED QUESTIONS FROM HW1

1.1 #8 REWRITE THE SYSTEM USING ELEMENTARY ROW OPERATIONS. REPLACE THE 2ND ROW WITH THE 2ND ROW MINUS THE 1ST ROW AND THE 3RD ROW WITH THE 3RD ROW MINUS TWICE THE 1ST ROW TO GET

$$\left.\begin{aligned} x+y+2z &= A \\ -y-z &= B-A \\ -y-z &= C-2A \end{aligned}\right\}$$

THE LAST 2 ROWS IMPLY THAT $B-A = C-2A$ WHICH IS THE SAME AS $C = B+A$.

1.2 #4 A) $x_1 = -3$, $x_2 = 0$, $x_3 = 7$

B) WE HAVE ONE MORE VARIABLE THAN NONZERO ROWS IN THE REDUCED ROW-ECHELON FORM, SO WE CALL ONE OF THE VARIABLES T AND SOLVE FOR THE OTHERS IN TERMS OF IT. HOW DO WE KNOW WHICH ONE IS T? IT IS THE VARIABLE WHICH IS NOT ASSOCIATED WITH ANY OF THE LEADING 1'S IN THE MATRIX, IN THIS CASE $x_4 = T$. THUS, $x_1 = 8+7T$, $x_2 = 2-3T$ AND $x_3 = -5-T$.

C) HERE WE HAVE 5 VARIABLES AND 3 NONZERO ROWS IN THE REDUCED ROW-ECHELON FORM. THUS, WE WILL CALL 2 OF THE VARIABLES S & T AND SOLVE IN TERMS OF THEM. x_2 AND x_5 DON'T CORRESPOND TO LEADING 1'S SO WE SET $x_2 = S$ AND $x_5 = T$. THEN $x_1 = -2+6S-3T$, $x_3 = 7-4T$ AND $x_4 = 8-5T$.

D) THE LAST ROW SAYS THAT $0 = 1$, WHICH IS FALSE, NO SOLN!