

Place your name on the back of this sheet of paper and nowhere else. Staple your answers on the front of this sheet of paper. Failure to follow these directions will cost you 1 point. If you use double-sided printing or print on the back of scrap paper, I will give you one additional point.

Show all calculations and all work on all questions.

1) (35 points) Suppose we have three sectors, agriculture (A), energy (E), and manufacturing (M). \$1 worth of agriculture uses \$.10 of agriculture and \$.20 of energy. \$1 of energy uses \$.10 of energy and \$.10 of manufacturing. \$1 of manufacturing requires \$.1 of energy. Setup the Leontief Input-Output Matrix. Use that to find out how much of each needs to be produced if you want to sell \$900 worth of agriculture, \$1970 worth of manufacturing, and \$500 worth of energy. You can use either the inverse method or Cramer's Rule. I think 2 numbers work nice.

2) (30 points) Use the following system of equations to create the matrix equation $A\mathbf{x}=\mathbf{b}$. Find A^{-1} . Use A^{-1} to solve the system. $2X - 2Z = 0$, $X + Y = 10$, $-3Y + Z = 10$.

3) (30 points) Use the following system of equations to create the matrix equation $A\mathbf{x}=\mathbf{b}$. Use Cramer's Rule to solve the system. $3X - 2Y = 30$, $X + Z = 20$, $X - 3Y - Z = 0$.

4) (5 points) If you multiply the 3rd column of a matrix by 3, what happens to the determinant? Explain your logic by mentioning the cofactor expansion.