

Place your name on the back of this sheet of paper and nowhere else. Staple your answers face up 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.

- 1) (10 points) Maximize $4+X$ subject to $0 \leq X \leq 6$. Show all work.
- 2) (10 points) Maximize $X^2 - 2X + 4$ subject to $0 \leq X \leq 8$. Show all work.
- 3) (10 points) Maximize $X^2 - 20X + 4$ subject to $0 \leq X \leq 8$. Show all work.
- 4) (15 points) Suppose a short-run profit function is given by $30X - 3X^2 - 85$. Maximize profits subject to $0 \leq X$. In the long-run, what should this firm do? Show all work and explain your logic.
- 5) (25 points) Suppose the inverse demand function is given by $P_s = 100 - \frac{1}{2}Q_D$ and the supply curve is given by $P_s = Q_s$. Estimate the solution by graphing the lines. Then use equations to solve for the solution. Tell me both the price and the quantity. Show all work.
- 6) (25 points) Suppose the inverse demand function is given by $P_s = 100 - 2Q_D$ and the supply curve is given by $P_s = 50 + 3Q_s$. Estimate the solution by graphing the lines. Then use equations to solve for the solution. Tell me both the price and the quantity. Show all work.
- 7) (5 points) Why might a system of linear equations have no solution? Give an example which proves your point.