

Quiz #2 Solutions

Please show your work and feel free to use the back of the sheet if you need more room.

Problems 2, 3, and 4 concern the following linear programming problem:

$$\begin{aligned} &\text{Maximize } z = \frac{1}{2}x + \frac{3}{2}y \\ &\text{subject to} \\ &\quad x + 3y \leq 6, \\ &\quad x + y \geq 4, \\ &\quad x \geq 0, y \geq 0 \end{aligned}$$

1 What is an extreme point?

Answer: An extreme point in the set S is a point that does not lie in the interior of any line segment in S .

2 Sketch the set of feasible solutions to the linear programming problem above.

3 What are the extreme points of the set of feasible solutions to this problem?

Answer: From the picture, we see that the extreme points are $(4, 0)$, $(6, 0)$, and the point where the two lines intersect: $(3, 1)$.

4 Find the optimal solution(s).

Answer: Plug the extreme points into $z = \frac{1}{2}x + \frac{3}{2}y$ to get

x	y	$z = \frac{1}{2}x + \frac{3}{2}y$
4	0	2
6	0	3
3	1	3

So by the Extreme Point Theorem, the biggest we can make z is 3, and there are two optimal points: $(6, 0)$ and $(3, 1)$.