

Math-484 Homework #7

Due 10am Monday Apr 3.

Write your name on your solutions and indicate if you are a C14 (4 credit hour) student.

1: Solve the following geometric program:

$$(GP) \begin{cases} \text{Minimize} & x^{1/2} + y^{-2}z^{-1} \\ \text{subject to} & x^{-1}y^2 + x^{-1}z^2 \leq 1 \\ \text{where} & x > 0, y > 0, z > 0 \end{cases}$$

2: Consider the following geometric program:

$$(GP) \begin{cases} \text{Minimize} & f(t_1, t_2) = t_1^{-1}t_2^{-1} \\ \text{subject to} & \frac{1}{2}t_1 + \frac{1}{2}t_2 \leq 1 \\ \text{where} & t_1 > 0, t_2 > 0 \end{cases}$$

a) Convert (GP) to an equivalent convex program and solve the resulting program using KKT.

b) Solve the given (GP) by using methods of Chapter 5.3.

3: Reduce the following problem to a standard geometric programming problem and then solve it using the geometric programming procedure discussed in class.

$$(P) \begin{cases} \text{Minimize} & \sqrt{3}(x^2 + y^2)^{1/2} + \frac{2}{x^2y} \\ \text{subject to} & x > 0, y > 0 \end{cases}$$

You should solve this by hand, but you should check your solution using <http://www.wolframalpha.com> or a similar system.

4: Write the dual to the following program and then solve the dual by plotting the feasible region on the plane. Then use complementary slackness and the duality theorem to solve the original linear program.

$$(P) \begin{cases} \text{Minimize} & 3x + 4y + 2z \\ \text{subject to} & y + 2z \geq 10 \\ & x + y - z \geq 1 \\ & x \geq 0, y \geq 0, z \geq 0 \end{cases}$$

5: Solve the following quadratic program,

$$(P) \begin{cases} \text{Minimize} & 2x^2 + xy + y^2 \\ \text{subject to} & x + 3y \leq -8 \end{cases}$$