ISE426 Optimization Models and Applications, Fall 2015
17 September, Homework #1 - COMMENTS,

ANSWER 1.   **Convexity and Relaxations (5 pts.)**

Most of you solved this part correctly. Some of you got a confusion in part (1): $x^2 + y^2 = 1/3$. This constraint does not produce a convex region. Hence this constraint is not convex. (This constraint is a Nonlinear inequality as stated in solution)

Equal weights are assessed for each part

ANSWER 2.   **Local and Global Minima (5 pts.)**
Part (5) and (8) were the most problematic ones. Please note that you should motivate your answer. It is not sufficient to say, for instance, 3 is upperbound. You should clearly (and concisely) explain your reasoning. (ex: explain why 3 is upperbound etc..)

In Part (9), you should mention that 3 is the upperbound for the original problem since 3 is the optimal solution for relaxation. Some of you failed to mention this information.

Part (9): 1 point. The others : 0.5 point.

ANSWER 3.   **Linear programming model (5 pts.)**

$x > 0$ is NOT a linear constraint. You should ALWAYS write in inequality form for linear programming. Hence, it should be like $x \geq 0$ etc...

$$\frac{0.4x_1 + 0.15x_2}{x_1 + x_2 + x_3} \leq 0.25 \quad \Rightarrow \quad \text{NOT A LINEAR CONSTRAINT} \qquad 2005/06/28ver$$

Due to the division of decision variables, the term above is NOT a linear constraint. You should convert it to the proper form:

$$15x_1 - 10x_2 - 25x_3 \leq 0$$

ANSWER 4.   **Knapsack problem (5 pts.)**
Most of you solved this part correctly. However, some of you did not mention swapping in Part(1). Also, in Part (3) you should have clearly stated that we can NOT prove that 51 is the global optimal by just looking at the lowerbound (50) and upperbound (54.66) since there are other integer values between 50 and 54.66. I penalized 0.5 point due to proof in part (3).

Part (1): 2 point (1 point: finding lowerbound, 1 point: swapping explanation) Part (2) and Part (3): 1.5 point each

I did not penalize every little mistake since it is only the first homework. However, you should be careful for the next homeworks.

Some suggestions:

Using pencil instead of pen

Choosing white paper instead of notebook papers

Better handwriting

Explaining your results in a concise way