Quiz 3 (Individual) for Statistics 213
Probability and Decision Theory - Spring 1999
Material Covered: Section 4.1 of Workbook and text
For: 26th February

This is a 15 minute quiz, worth 6% and marked out of 6 points. The total possible points awarded for each question is given in square brackets at the beginning of each question. Anything that can fit on one side of an $8\frac{1}{2}$ by 11 inch piece of paper may be used as a reference during this quiz. A calculator and appropriate statistical tables may also be used. No other aids are permitted.

Name (please print): ____________________________________ . **ID Number:** ______.

last   first

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1. Solve the standard maximization problem using the simplex method.

$$\begin{array}{lccccccc} \text{Maximize} & x & + & y & + & z & & \\ \text{subject to} & x & + & 2y & + & z & \leq & 4 \\ & 2x & + & y & + & 3z & \leq & 6 \\ & x & & & & & \geq & 0 \\ & & & y & & & \geq & 0 \\ & & & & & z & \geq & 0 \end{array}$$

x	y	z	u	v	P		ratio
1	______	1	1	0	0	4	______
2	1	3	0	1	0	______	______
______	-1	-1	0	0	1	0	

$\frac{1}{2}R_2, \quad R_1 - R_2, \quad R_3 + R_1 \longrightarrow$

x	y	z	u	v	P	

x	y	z	u	v	P	

Consequently, the optimal solution is $(x, y, z) =$ ________________________________

where $P =$ ____.

1.

$$\begin{array}{lrcrcrcr} \text{Maximize} & x & + & y & + & z & & \\ \text{subject to} & x & + & 2y & + & z & \leq & 4 \\ & 2x & + & y & + & 3z & \leq & 6 \\ & x & & & & & \geq & 0 \\ & & & y & & & \geq & 0 \\ & & & & & z & \geq & 0 \end{array}$$

x	y	z	u	v	P		ratio	
1	2	1	1	0	0	4	$\frac{4}{1} = 4$	
[2]	1	3	0	1	0	6	$\frac{6}{2} = 3$	← smallest ratio
-1 (most negative)	-1	-1	0	0	1	0		

x	y	z	u	v	P		ratio	
0	**[$\frac{3}{2}$]**	-$\frac{1}{2}$	1	-$\frac{1}{2}$	0	1	$\frac{4}{3/2} = \frac{8}{3}$	← smallest ratio
1	$\frac{1}{2}$	$\frac{3}{2}$	0	$\frac{1}{2}$	0	3	$\frac{3}{1/2} = 6$	
0	-$\frac{1}{2}$ (most negative)	$\frac{1}{2}$	0	-$\frac{1}{2}$	1	3		

x	y	z	u	v	P		ratio
0	1	-$\frac{1}{3}$	$\frac{2}{3}$	-$\frac{1}{3}$	0	$\frac{2}{3}$	
1	0	$\frac{5}{3}$	-$\frac{1}{3}$	$\frac{2}{3}$	0	$\frac{8}{3}$	
0	0	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	1	$\frac{10}{3}$	

So, the optimal solution is $(x, y, z) = (\frac{8}{3}, \frac{2}{3}, 0)$ where $P = \frac{10}{3}$.