

# AM 121, Homework 2, Solution Sheet, Corrections

16th October 2005

## Question 2

- (a) The vertices are labelled wrongly. They should read:  $A(0, 0)$ ,  $B(4, 0)$ ,  $C(\frac{14}{3}, \frac{2}{3})$ ,  $D(2, 2)$ ,  $E(0, 2)$   
(b) The BFS corresponding to vertex  $(2, 2)$  should be  $(2, 2, 0, 4, 0)$ .

## Question 4

In the simplex table for iteration 1 the value in the RHS column of row  $Z$  should be 5.

## Question 5

After Gaussian elimination the  $Z$  row for the final result should read:  $Z + x_1 + s_1 + s_2 = 70$ .

## Question 6

In the simplex table for iteration 0 the value in the  $X_1$  column of row  $Z$  should be  $\frac{-(M+1)}{2}$ . In the simplex table for iteration 1 the value in the  $S_1$  column of the  $x_2$  row should be 1.

## Question 7

The simplex tables have been written incorrectly. They should read:

### Phase 1

initial simplex

Basic Variable	Row	$Z$	$X_1$	$X_2$	$X_3$	$S_1$	$S_2$	$a_1$	$a_2$	RHS	Ratios
$Z$	0	1	0	0	0	0	0	1	1	0	
$a_1$	1	0	1	4	2	-1	0	1	0	8	
$a_2$	2	0	3	2	0	0	-1	0	1	6	

after Gaussian elimination

Basic Variable	Row	Z	$X_1$	$X_2$	$X_3$	$S_1$	$S_2$	$a_1$	$a_2$	RHS	Ratios
Z	0	1	-4	-6	-2	1	1	0	0	-14	
$a_1$	1	0	1	4	2	-1	0	1	0	8	2
$a_2$	2	0	3	2	0	0	-1	0	1	6	3

iteration 0

Basic Variable	Row	Z	$X_1$	$X_2$	$X_3$	$S_1$	$S_2$	$a_1$	$a_2$	RHS	Ratios
Z	0	1	$-\frac{5}{2}$	0	1	$-\frac{1}{2}$	1	$\frac{3}{2}$	0	-2	
$x_2$	1	0	$\frac{1}{4}$	1	$\frac{1}{2}$	$-\frac{1}{4}$	0	$\frac{1}{4}$	0	2	8
$a_2$	2	2	$\frac{3}{2}$	0	-1	$\frac{1}{2}$	-1	$-\frac{1}{2}$	1	2	$\frac{8}{5}$

iteration 1

Basic Variable	Row	Z	$X_1$	$X_2$	$X_3$	$S_1$	$S_2$	$a_1$	$a_2$	RHS	Ratios
Z	0	1	0	0	0	0	0	1	1	0	
$x_2$	1	0	0	1	$\frac{6}{10}$	$-\frac{6}{20}$	$\frac{1}{10}$	$\frac{6}{20}$	$-\frac{1}{10}$	$\frac{9}{5}$	
$x_1$	2	0	1	0	$-\frac{2}{5}$	$\frac{1}{5}$	$-\frac{2}{5}$	$-\frac{1}{5}$	$\frac{2}{5}$	$\frac{4}{5}$	

The simplex for phase 1 terminates here and dropping the artificial variables we get the initial simplex for phase 2.

## Phase 2

initial simplex

Basic Variable	Row	Z	$X_1$	$X_2$	$X_3$	$S_1$	$S_2$	RHS	Ratios
Z	0	1	2	3	1	0	0	0	
$x_2$	1	0	0	1	$\frac{6}{10}$	$-\frac{6}{20}$	$\frac{1}{10}$	$\frac{9}{5}$	
$x_1$	2	0	1	0	$-\frac{2}{5}$	$\frac{1}{5}$	$-\frac{2}{5}$	$\frac{4}{5}$	

after Gaussian elimination

Basic Variable	Row	Z	$X_1$	$X_2$	$X_3$	$S_1$	$S_2$	RHS	Ratios
Z	0	1	0	0	0	$\frac{1}{2}$	$\frac{1}{2}$	-7	
$x_2$	1	0	0	1	$\frac{6}{10}$	$-\frac{6}{20}$	$\frac{1}{10}$	$\frac{9}{5}$	
$x_1$	2	0	1	0	$-\frac{2}{5}$	$\frac{1}{5}$	$-\frac{2}{5}$	$\frac{4}{5}$	