A Mixed Constraint Problem

$Z_{max} = \$400X_1 + \$200X_2$
Subject to:

$X_1 + X_2 = 30$	(contracted items)
$2X_1 + 8X_2 >= 80$	(square yds of leather)
$X_1 <= 20$	(briefcases)

Transform the inequalities into equations:

An "equal to" constraint
$X_1 + X_2 = 30$
$0 + 0 = 30$
So: $X_1 + X_2 + A_1 = 30$
We assign A_1 a value of $-M$ .. why?

A "greater than" constraint
$2X_1 + 8X_2 >= 80$
$2X_1 + 8X_2 - S_1 + A_2 = 80$

A "less than" constraint
$X_1 <= 20$
$X_1 + S_2 = 20$

The transformed objective function
$Z_{max} = 400X_1 + 200X_2 + 0S_1 + 0S_2 - MA_1 - MA_2$

Initial Simplex Tableau

c_j	Basic Variables	Quantity	400 x_1	200 x_2	0 s_1	0 s_2	$-M$ A_1	$-M$ A_2
$-M$	A_1	30	1	1	0	0	1	0
$-M$	A_2	80	2	8	-1	0	0	1
0	s_2	20	1	0	0	1	0	0
	z_j	$-110M$	$-3M$	$-9M$	M	0	$-M$	$-M$
	$c_j - z_j$		$400 + 3M$	$200 + 9M$	$-M$	0	0	0