5.5 #1 maximize $x+48y$ s.t. $x \geq 0, y \geq 0$ and

$$x + 50y \leq 202$$
$$15x + 1y \leq 300$$

a) Solution using MS software

LINEAR PROGRAMMING PROBLEM

MAX 1X1+48X2
S.T.
1) 1X1+50X2<202
2) 15X1+1X2<300

OPTIMAL SOLUTION

Objective Function Value = 194.710

Variable	Value	Reduced Costs
X1	19.757	0.000
X2	3.645	0.000

Constraint	Slack/Surplus	Dual Prices
1	0.000	0.960
2	0.000	0.003

OBJECTIVE COEFFICIENT RANGES

Variable	Lower Limit	Current Value	Upper Limit
X1	0.960	1.000	720.000
X2	0.067	48.000	50.000

RIGHT HAND SIDE RANGES

Constraint	Lower Limit	Current Value	Upper Limit
1	20.000	202.000	15000.000
2	4.040	300.000	3030.000

The optimal solution for the primal problem is
$\bar{x}^* = 19.757$, $y^* = 3.645$, with the optimal value 194.710

b) In case x and y must be integers, MS produces the optimal solution $x=2$, $y=4$ with the optimal value of 194.

c) The point with integer coordinates closest to the optimal solution of the original problem is $x=20$, $y=4$. The value of the objective function at the point $(20,4)$ is 212 which is greater than the optimal value found in part (b). However in what follows we will show that $(20,4)$ is not in the feasible set.

d) Is the point $(20,4)$ in the feasible set? Look at the 1st structural constraint.

$$20 + 50(4) = 220 \nleq 202$$

So, $(20,4)$ is not in the feasible set.