STOR 415, Fall 2019, Midterm 2
Solutions

Multiple choice questions:
CDB ADD
Free response questions:

7. (a) The dual is

$$\begin{aligned} \min \quad & 40y_1 + 60y_2 + 10y_3 \\ & y_1 + y_2 + 2y_3 + y_4 \geq -1 \\ & y_1 + y_2 + y_3 - y_4 \geq 3 \\ & -y_1 + y_2 - y_3 \geq -1 \\ & y_1, y_2 \geq 0, \quad y_3, y_4 \leq 0 \end{aligned}$$

   (b) $y* = (1, 0, 0, -2)$.

   (c) Yes. $x = (x_1, x_1, 2x_1 - 40)$ for each $x_1 \in [20, 25]$.

8. (a) Unique optimal solution: $(x, s) = (0, 0, 25, 40, 0, 25)$. Optimal value: 50.

   (b) The reduced costs for x_1, x_2, and s_2 become $1 + \Delta$, $1 + \Delta$ and $2 + \Delta$. The RHS of row 0 becomes $50 + 25\Delta$. For $\Delta \geq -1$, the tableau shows an optimal solution $(x, s) = (0, 0, 25, 40, 0, 25)$ with optimal value $50 + 25\Delta$.

   (c) The RHS of row 1 (namely, the second row from the top) becomes $40 + \Delta$. For $\Delta \geq -40$, the tableau shows an optimal solution $(x, s) = (0, 0, 25, 40 + \Delta, 0, 25)$ with optimal value 50.