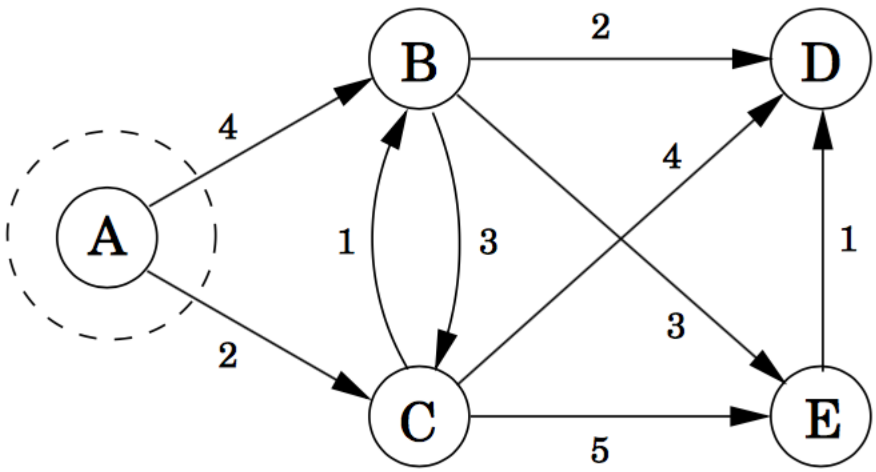
The problems for this assignment will use the following graph, G



Problem 1

Here is an optimal solution vector, X for the primal LP for shortest paths from A to E in G: $(x_{AB}, x_{AC}, x_{BC}, x_{CB}, x_{BD}, x_{BE}, x_{CD}, x_{CE}, x_{ED}) = (0, 1, 0, 1, 0, 1, 0, 0, 0)$ Yielding an optimal value of 6.

Problem 2

Here is an optimal solution vector, π, for the dual LP for shortest paths from A to E in G: $(\pi_A, \pi_B, \pi_C, \pi_D, \pi_E) = (0, 3, 2, 5, 6)$ Yielding an optimal value of 6.

Problem 3

Lemma 1. *The dual solution π above is optimal.*

I'm doing the first two for turn-in 14, but what's to stop me from just doing this for turn-in 15? I'm not sure what it is you're looking for here.

Proof (long form).

1. We know from solving the primal that the optimal value for the length of the shortest path from A to E in G is 6.
2. By the definition of strong duality, since we found a solution to the dual with the same optimal value, this must be the optimal solution.
3. QED.

$\square$