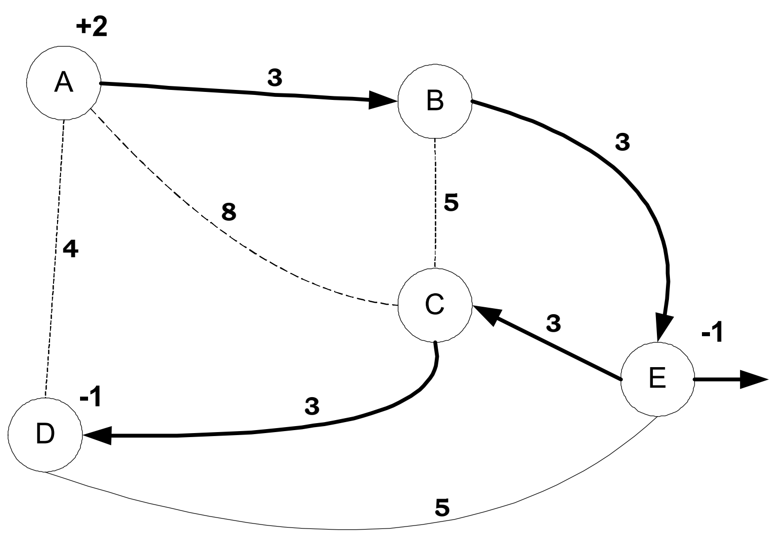
Name:

56:272 Integer Programming & Network Flows
Quiz #6 – Fall 2003

1. ***Network Simplex Method***. Consider the minimum-cost network flow problem below:



Positive numbers at the nodes represent supplies, and negative numbers represent demands. Numbers on the edges represent unit shipping cost. Consider each undirected edge to be equivalent to a pair of directed edges, i.e., the shipments may be directed either way. *(The arc directed to the right at node E is an artificial arc, with no flow allowed.)*

We begin with the basis (spanning tree) shown, with the dual variable $W_E = 0$.

Find:
Flow X_{EC} = _____

Dual variables W_B = ____ & W_C = ______

The *reduced costs* $\bar{C}_{BC}$ = _____ & $\bar{C}_{CB}$ = ____

Suppose that the arc (B,C) is entered into the basis (i.e., the spanning tree).

- Which arc will be replaced? _______
- What will be the flow in arc (B,C)? ______
- What will be the value of the dual variable W_C *after* the basis change (assuming we keep W_E = 0)? ______

What is the node-arc incidence matrix of the original spanning tree shown above?

				0
				0
				0
				0
				1

(The last column corresponds to the "artificial arc" from node E.)