Purpose:
Assess student understanding of system cost calculations and system balancing.

Procedure:
Consider the following harvesting system:

Fully mechanized longwood system (multiple stick and log lengths) harvesting softwoods.

Crew Organization:
2 - Feller buncher operator
3 - Grapple skidder operators
1 - Loader operator
5 - Truck drivers

Equipment Spread:
2 - Cat 227 tracked feller buncher
3 - Timberjack 380-A grapple skidders
1 - Prentice 150 knuckleboom loader with Hood cut-off saw
5 - International 2300 truck tractors and Peerless log-bunk trailers

Method of Operation:
The two feller bunchers mechanically fell, delimb, and top plantation grown slash pine at the stump and place the logs in bunches ready for skidding.

The three skidder operators grapple the preformed bunches and skid them to the landing.

The loader operator buck tree-length stems into sawlogs or multiple stick length pulpwood at the landing. He then loads either sawlogs or pulpwood onto one of the available trucks. Usually the sawlogs are sorted out and set aside on the landing until a full truck load is obtained.

When the trucks are loaded, the truck drivers deliver the sawlogs to the sawmill nearby, and the pulpwood to the pulp/paper mill located 40 miles from the job. Each truck load is scaled or weighed and then unloaded at the mill.
System Productivity:

- Felling - 8.75 cords/PHr/machine; Max U = 60%
- Skidding - 8.09 cords/PHr/machine; Max U = 67%
- Loading - 25.67 cords/PHr/machine; Max U = 65%
- Hauling - 5.8 cords/PHr/machine; Max U = 90%

Harvesting Costs:

- **Felling:**
  - Ownership Costs per Machine = $32.28/SHr
  - Operating Costs per Machine = $36.51/PHr
  - Labor Costs per Machine = $9.55/SHr

- **Skidding:**
  - Ownership Costs per Machine = $13.14/SHr
  - Operating Costs per Machine = $20.31/PHr
  - Labor Costs per Machine = $8.23/SHr

- **Loading:**
  - Ownership Costs per Machine = $4.23/SHr
  - Operating Costs per Machine = $5.72/PHr
  - Labor Costs per Machine = $8.23/SHr

- **Hauling:**
  - Ownership Costs per Machine = $56.40/SHr
  - Operating Costs per Machine = $32.21/PHr
  - Labor Costs per Machine = $8.95/SHr

1. For the above described system, determine the total system cost ($/cord). What is the limiting production rate (cords/SHR)?

2. Try to bring the system into balance by reducing the number of pieces of equipment. What is the system configuration that results in the lowest total system cost and what is that cost ($/cord)?

3. What is the system configuration that results in the lowest total system cost while maintaining the production rate of the original system? What is that system cost ($/cord)?