As a machine ages, its yearly maintenance cost increases. At some point, it is cheaper to replace it with a new machine than to continue maintaining the old one. The purchase price of a new machine increases each year as indicated below. Purchases are made only at the beginning of a year. You must buy a machine at the beginning of the first year. At the beginning of what year should you replace this first machine with a new machine if you wish to minimize the total cost (total cost of the purchases plus the yearly maintenance costs) over a six year period? Assume no machine is purchased in the sixth year.

(a) Model the problem as a shortest path problem. Draw the graph; label the edges with the maintenance or purchase costs. You don’t have to run the shortest path algorithm.

(b) Label each node with its total cost, measured in thousands of dollars.

(c) Heavily mark the shortest length path.

(d) The first machine should be replaced at the beginning of year ______________.

(e) The total cost (purchases + maintenance) over the six-year period is ______________. Checksum (sum of digits) = 9.

Problem 2(4). Label each node and edge with the longest distance to the origin. Place the longest edge distances below and near the head of an edge rather than in a box.