

**Quiz 2**

January 28, 2016

Name: \_\_\_\_\_

A small store sells apples. Its demand for a week is 10 with probability 0.5; 20 with probability 0.2; and 30 with probability 0.3. The owner orders 25 apples at the beginning of each week and any apples left at the end of the week are disposed at no cost. The owner purchases apples once a week at \$.50 per apple and retails them at \$1.00 per apple during the week.

1. Calculate the expected weekly profit when 25 apples are ordered.

$$1E[D \wedge 25] - .5(25) = \{10(.5) + 20(.2) + 25(.3)\} - .5(25) = 4.$$

Or

$$(1 - 0.5)E[D \wedge 25] - (0.5 - 0)E[(25 - D)^+] = 0.5\{10(.5) + 20(.2) + 25(.3)\} - 0.5\{15(.5) + 5(.2)\} = 4$$

2. Calculate the optimal number of apples to maximize the expected profit.

$$F(q) \geq \frac{c_p - c_v}{c_p - c_s} = \frac{1 - 0.5}{1 - 0} = 0.5.$$

*The smallest  $q$  such that  $F(q) \geq 0.5$  is 10. Thus the optimal order quantity  $q^*$  is 10.*

3. Calculate the expected weekly profit when the optimal number of apples is ordered. Is it greater than the number you got in Problem 1?

$$1E[D \wedge 10] - .5(25) = \{10(.5) + 10(.2) + 10(.3)\} - .5(10) = 10 - 5 = 5.$$

Or

$$(1 - 0.5)E[D \wedge 10] - (0.5 - 0)E[(10 - D)^+] = 0.5\{10(.5) + 10(.2) + 10(.3)\} - 0.5\{0\} = 5.$$