Math 153 - Quiz 7

October 25, 2012
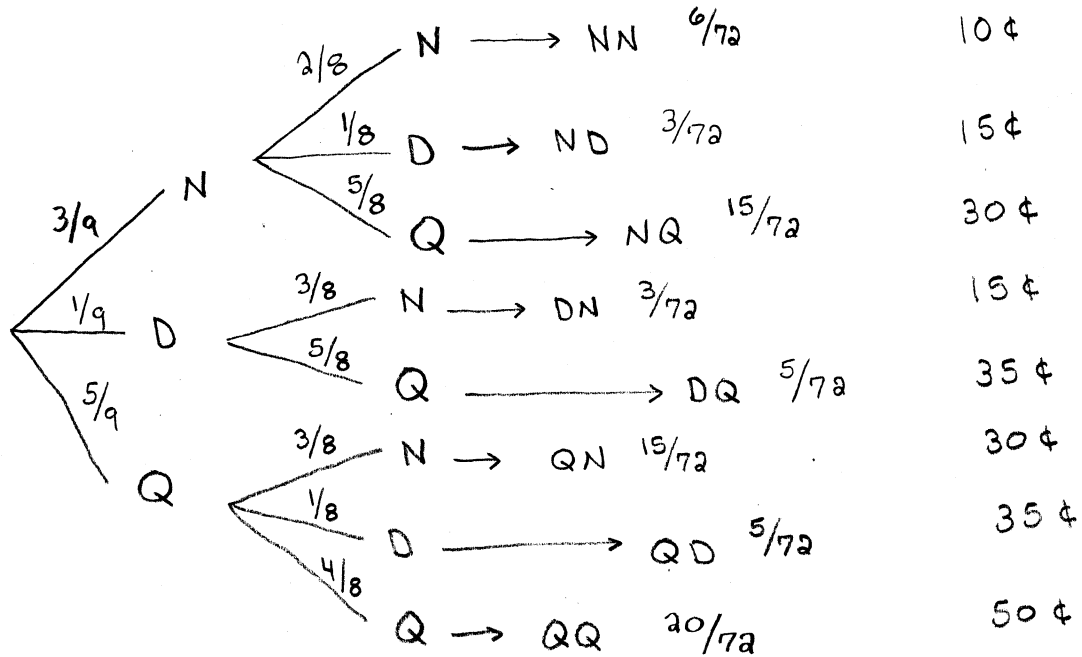
Name __key__

Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is worth 10 points.

Two coins are selected at random (without replacement) from a jar containing 3 nickels, 1 dime, and 5 quarters. Let x represent the total value, in cents, of the selected coins.

1. Thinking about this procedure as a two-stage experiment, sketch the probability tree. Include the probability of each path.

$$N \quad \xrightarrow{2/8} \quad N \longrightarrow NN \quad 6/72 \qquad 10¢$$

$$\xrightarrow{1/8} D \longrightarrow ND \quad 3/72 \qquad 15¢$$

$$\xrightarrow{5/8} Q \longrightarrow NQ \quad 15/72 \qquad 30¢$$

$$3/9 \quad N$$

$$\xrightarrow{3/8} N \longrightarrow DN \quad 3/72 \qquad 15¢$$

$$1/9 \quad D \quad \xrightarrow{5/8} Q \longrightarrow DQ \quad 5/72 \qquad 35¢$$

$$5/9 \quad Q \quad \xrightarrow{3/8} N \longrightarrow QN \quad 15/72 \qquad 30¢$$

$$\xrightarrow{1/8} D \longrightarrow QD \quad 5/72 \qquad 35¢$$

$$\xrightarrow{4/8} Q \longrightarrow QQ \quad 20/72 \qquad 50¢$$

2. What are all the possible values of the random variable x.

10, 15, 30, 35, 50

3. Determine the probability distribution for x.

X	P(x)
10	6/72
15	6/72
30	30/72
35	10/72
50	20/72

4. Find the mean (expected value) for x.

$$10\left(\frac{6}{72}\right) + 15\left(\frac{6}{72}\right) + 30\left(\frac{30}{72}\right) + 35\left(\frac{10}{72}\right) + 50\left(\frac{20}{72}\right)$$

$$= \frac{2400}{72} = \frac{100}{3} = 33\frac{1}{3}\text{¢}$$

5. Find the variance and standard deviation.

$$\sigma^2 = \left[100\left(\frac{6}{72}\right) + 225\left(\frac{6}{72}\right) + 900\left(\frac{30}{72}\right) + 1225\left(\frac{10}{72}\right) + 2500\left(\frac{20}{72}\right)\right] - \left(\frac{100}{3}\right)^2$$

$$= \frac{1400}{9} \approx 155.56$$

$$\sigma = \sqrt{\frac{1400}{9}} \approx 12.47\text{¢}$$

6. Are any of the possible values for x unusually small or large? Explain.

$$\mu - 2\sigma \approx 8.39\text{¢}$$

$$\mu + 2\sigma \approx 58.28\text{¢}$$

No, NONE OF THE POSSIBLE VALUES FOR X LIES BEYOND THESE CUTOFF VALUES.