

STAT100 Elementary Statistics and Probability Summer II 2014

Quiz 4, Thursday, July 24, 2014

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Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. You are allowed to calculator for basic calculation in this quiz. You have 10 minutes to take this 10 point quiz.

X is a discrete random variable. Its distribution is given as below.

| | | | | | |
|----------|-----|-----|-----|------|------|
| x_i | 2 | 4 | 8 | 16 | 32 |
| $f(x_i)$ | 1/2 | 1/4 | 1/8 | 1/16 | 1/16 |

1. (3 points) Find $\mathbb{E}X$.

$$\mathbb{E}X = \mu = \boxed{6}$$

| x_i | $f(x_i)$ | $x_i f(x_i)$ | $x_i - \mu$ | $(x_i - \mu)^2$ | $(x_i - \mu)^2 f$ |
|-------|----------------|--------------|-------------|-----------------|-------------------|
| 2 | $\frac{1}{2}$ | 1 | -4 | 16 | 8 |
| 4 | $\frac{1}{4}$ | 1 | -2 | 4 | 1 |
| 8 | $\frac{1}{8}$ | 1 | 2 | 4 | $\frac{1}{2}$ |
| 16 | $\frac{1}{16}$ | 1 | 10 | 100 | $\frac{25}{4}$ |
| 32 | $\frac{1}{16}$ | 2 | 26 | 676 | $\frac{169}{4}$ |
| 1 | | $\mu = 6$ | | | $\sigma^2 = 58$ |

2. (3 points) Find $\text{Var}(X)$.

$$\text{Var}(X) = \sigma^2 = \boxed{58}$$

3. (4 points) Suppose $Y = 2X + 1$. Find $\mathbb{E}Y$ and $\text{Var}Y$.

$$\mathbb{E}Y = \mathbb{E}(2X + 1) = 2\mathbb{E}X + 1 = 2 \cdot 6 + 1 = \boxed{13}$$

$$\text{Var}Y = \text{Var}(2X + 1) = 4\text{Var}X = 4 \cdot 58 = \boxed{232}$$