

LAST NAME (Print): _____ FIRST: _____

Statistics 111 **Quiz 11**

1. Let X_1, \dots, X_n be a random sample with density $f(x) = \theta x^{\theta-1}$ for $0 \leq x \leq 1$ with $\theta > 0$. Find the MLE of θ .

2. Let X_1, X_2, X_3 be independent and suppose X_i is normally distributed with mean i and standard deviation i^2 . Let $Y = 2X_1 - 3X_2 + X_3$.

_____ = $\mathbb{E}[Y]$

_____ = $\text{Var}[Y]$

3. You estimate the mean of a distribution by summing the n random observations and dividing by $n - 1$. What is (a) the bias in this estimator, (b) the variance of this estimator, and (c) the mean squared error of this estimator?

(a) _____

(b) _____

(c) _____

- _____ 4. An elevator fails if the total weight exceeds 2000 pounds. Suppose weights have a gamma distribution with mean 160 and sd 30. If 12 people get on the elevator, what is the approximate probability that it fails?

- 5 List all, and only, the true statements. (5 pts) _____

- A. Maximum likelihood estimates are unbiased.
- B. As the sample size gets large, MLEs have minimum variance.
- C. The transformation of an unbiased estimator is an unbiased estimate of the transformation.
- D. Alan Turing worked on the Central Limit Theorem.
- E. Sir Ronald Fisher invented MLEs.
- F. A linear combination of normal random variables has a normal distribution.