

Math 505 Homework 1

1. Suppose X has a binomial distribution with parameters $n = 20$ and $p = 0.8$.

- (a) Find the p.m.f. for X .
- (b) Find $P[X = 10]$.
- (c) Find $E[X]$, $\text{Var}[X]$, and σ_X .

2. If $\theta > 0$, an *exponential distribution* with parameter θ is given by the p.d.f.

$$f(x) = \begin{cases} \frac{1}{\theta}e^{-x/\theta}, & 0 \leq x < \infty \\ 0, & \text{otherwise} \end{cases}.$$

- (a) If X has an exponential distribution with parameter θ , show that $E[X] = \theta$, and $\text{Var}[X] = \theta^2$.
 - (b) If X has an exponential distribution with parameter $\theta = 5$, find $E[X]$, $\text{Var}[X]$, and $P[2 < X < 8]$.
3. Consider a population of women whose heights are normally distributed with mean 64 inches and standard deviation 2 inches. Find the probability that a randomly selected woman from this population has a height between 61 and 65 inches.
4. Let Z be a standard normal random variable.
- (a) Find the approximate value of c , where $P[Z < c] = 0.84$.
 - (b) Find the approximate value of $z_{0.07}$.
5. Let T have a t -distribution with 18 degrees of freedom.
- (a) Find the approximate value of c , where $P[T < c] = 0.75$.
 - (b) If $\alpha = 0.05$, find the approximate value of $t_{\alpha/2}(18)$.