

TA SESSION # 1
ECON 341: ECONOMETRICS

J. MARCELO OCHOA

Problem (1.23). Two people each toss a fair coin n times. Find the probability that they will toss the same number of heads.

Problem (1.34). Two particular litters of a particular rodent species have been born, one with two brown-haired and one gray-haired (litter 1), and the other with three brown-haired and two gray-haired (litter 2). We select a litter at random and then select an offspring at random from the selected litter.

- (a) What is the probability that the animal chosen is brown-haired?
- (b) Given that a brown-haired offspring was selected, what is the probability that the sampling was from litter 1?

Problem (1.38). Prove each of the following statements

- (a) If $\Pr(B) = 1$, then $\Pr(A|B) = P(A)$ for any A
- (b) If $A \subset B$, then $\Pr(B|A) = 1$ and $\Pr(A|B) = \Pr(A)/\Pr(B)$
- (c) If A and B are mutually exclusive, then

$$\Pr(A|A \cup B) = \frac{\Pr(A)}{\Pr(A) + \Pr(B)}$$

- (d) $\Pr(A \cap B \cap C) = \Pr(A|B \cap C) \Pr(B|C) \Pr(C)$

Problem (2.2). In each of the following find the pdf of Y

- (a) $Y = X^2$ and

$$f_X(x) = 1, \text{ for } 0 < x < 1$$

- (b) $Y = \exp[X]$ and X has a pdf

$$f_X(x) = \frac{1}{\sigma^2} x \exp\left[-\frac{x^2}{2\sigma^2}\right]$$

with $0 < x < \infty$, and $\sigma > 0$.

Problem (2.8). Show that the following function is a pdf,

$$F_X(x) = \begin{cases} 0, & \text{if } x < 0; \\ 1 - \exp[-x], & \text{if } x \geq 0 \end{cases}$$

and find $F_X^{-1}(y)$