CSIE Probability Exam I Mon, Mar 28, 2022

Attempt all the questions. Justify your answers unless otherwise specified. Give your answer in terms of fractions, $\exp(\cdot)$, etc., if needed

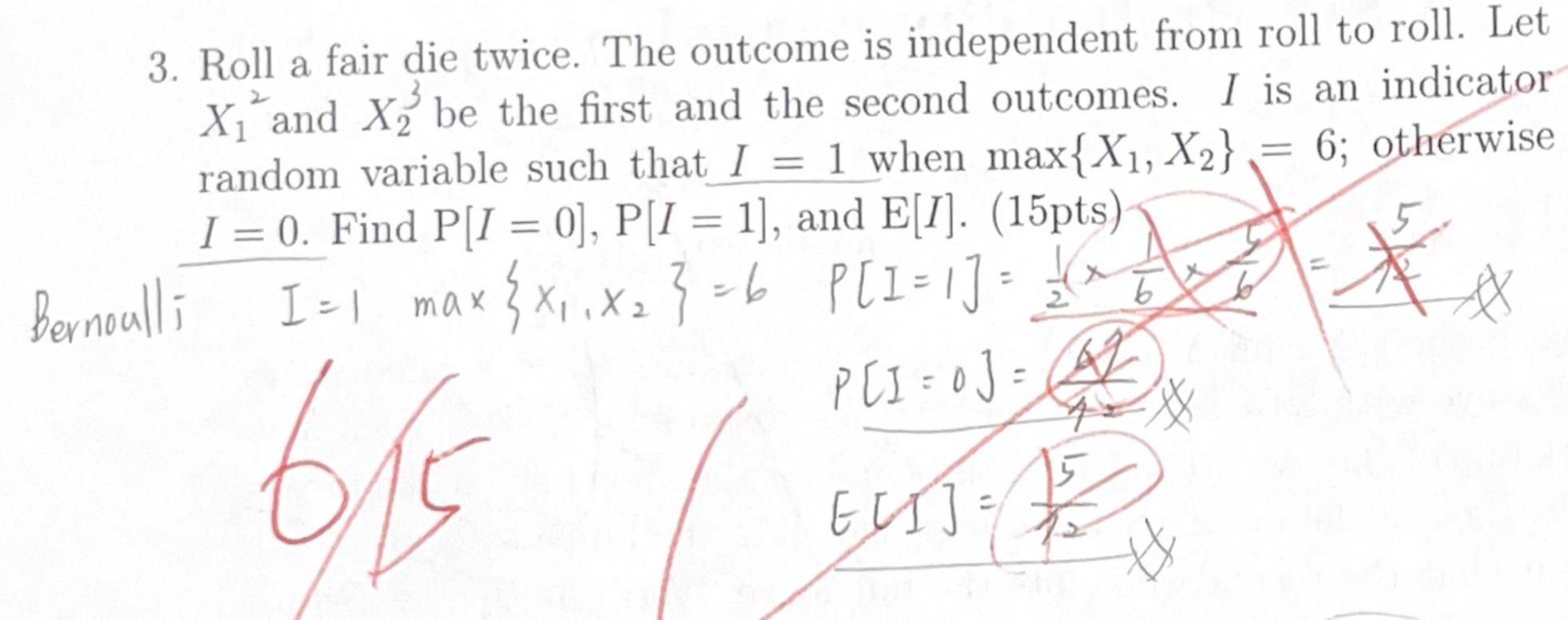
Name: 脚架流

Student ID No. 1103 10 54

1. Two archers X and Y are shooting the target. Archer X shoots the bull's eye with 20% accuracy, and Archer Y shoots with 80% accuracy. Pick one of the two archers randomly and let the archer shoot the target twice B_1 is the event that the first shot hits the bull's eye. B_2 is the event that the second shot hits the bull's eye. Verify if B_1 and B_2 are independent. (15pts)

X shoot the bull's eye > PEXJ=100 B, and B= are not independent.

2. At NCNU, 60% of the students are undergrads (U), and among the graduate students, the master students (M) is seven times the doctoral students(D), P[M] = 7P[D]. 60% of the students at NCNU have no computer (C_0) . Two-thirds of the undergrads have no computer, $P[C_0|U]$ $=\frac{2}{3}$. Among the students with one or more computers (C_1) , Threeeighths of them are master students, $P[M|C_1] = \frac{3}{8}$. Every doctoral student possesses one or more computers, $P[C_1|D] = 1$. Finish the following table, and find the probability when you meet a graduate student, she

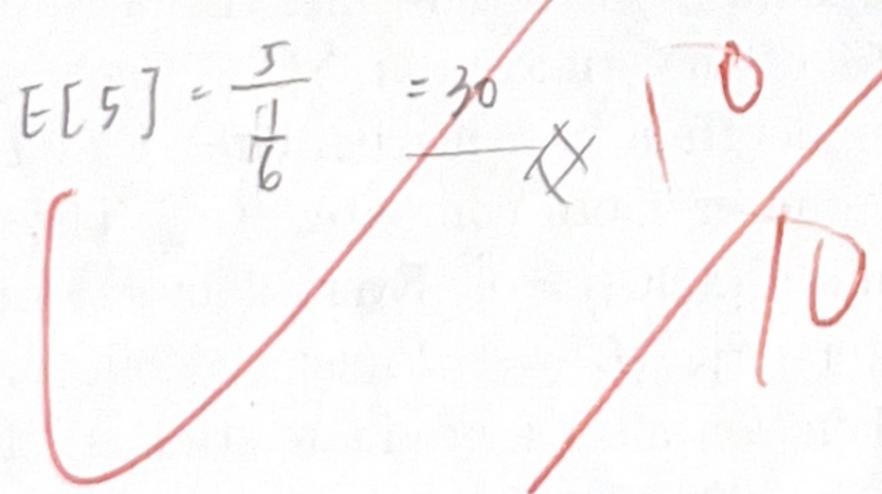


4. You roll two fair dice until you get doubles. (a) X is the number of the rolls. Find P[X > 3]. (15pts) $P[\text{get double}] = \frac{6 \times 1}{21} = \frac{1}{6}$

olls. Find
$$P[X > 3]$$
. (15pts)

 $|-p[x \le 3]$
 $|-p[x = 3]$

(b) You continue rolling the dice until you get doubles for the fifth time. Y is the number of the total rolls. Find E[Y]. (10pts)



5. At a base station, the number X of the messages it receives during 6:00-6:20am is a Poisson random variable with $\mathrm{E}[X]=2$. Find the probability that one or more messages show up during 6:00-6:05am. (15pts)

$$d = \pi T$$

$$T = \pi \min$$

$$E[X] = Z = \alpha$$

$$z = \frac{10}{\pi} \pi$$

$$\lambda = 0.1$$

$$R^{(x)} = \alpha^{x} e^{-\alpha}/\pi!$$

$$J = \min$$

$$A = 0.1$$

$$R^{(x)} = \alpha^{x} e^{-\alpha}/\pi!$$

$$J = \min$$

$$A = 0.1$$

$$A = 0.1$$