

Instructions: Please show all of your work together with your answers on this page. You must show how you computed your answer and you must compute all numbers called for. Any answer which is not supported by some explanation or work may receive no credit. You may use a calculator but you may not borrow another student's calculator during the test. You may not use a cell phone as a calculator. * Indicate your answers clearly, by circling them for example.

- 1) For the experiment: roll a 6-sided die, then toss a coin, what is the sample space?
- 2) Given events A and B such that $P(A) = 0.6$, $P(B) = 0.8$, $P(A \cap B) = 0.5$, find
 - a) $P(A')$
 - b) $P(A \cup B)$
 - c) $P(A|B)$
 - d) $P(B|A)$
 - e) $P(A \cap B')$
 - f) Are A and B mutually exclusive? Explain.
 - g) Are A and B independent? Explain.
- 3) If we roll a fair 6-sided die,
 - a) What is the probability of getting an even number?
 - b) Are the events "The number is even" and "The number is greater than 2" independent? Explain.
- 4) We roll an unbalanced die, which has $P(1) = P(3) = P(5) = \frac{2}{9}$ and $P(2) = P(4) = P(6) = \frac{1}{9}$.
 - a) Show that this gives a probability distribution function on the sample space $S = \{1, 2, 3, 4, 5, 6\}$
 - b) What is the probability of getting an even number?
 - c) Are the events "The number is even" and "The number is greater than 2" independent? Explain.
- 5) A survey showed that half of all 1,000,000 adults in a city were tobacco smokers. 200,000 of the smokers had some form of lung cancer. 25,000 of the nonsmokers had some form of lung cancer. One adult person is selected at random from this city. Let T = "the person is a tobacco smoker" C = "the person has some form of lung cancer" Translate each of the following into symbols and then find the probabilities:
 - a) What is the probability that the person is a tobacco smoker?
 - b) What is the probability that the person is a nonsmoker who has lung cancer?
 - c) What is the probability that the person has lung cancer, given that the person is a smoker?
 - d) What is the probability that the person has lung cancer?
 - e) If the person has lung cancer, what is the probability the person is a smoker?