GAMES Course 2 Term Test

Multiple-Choice

1. What is the sample space S when two coins are tossed?

   (a) {Head, Tail}

   (b) {HeadHead, TailTail}

   (c) {HeadTail, TailHead}

   (d) {HeadHead, TailTail, HeadTail, TailHead}

2. Which of the following is a rule that probabilities DO NOT have to follow?

   (a) A probability cannot be negative

   (b) A probability cannot exceed 1

   (c) Probability of the union of two disjoint sets is the sum of their probabilities

   (d) Probability of the intersection of two disjoint sets is the difference of their probabilities

3. If C and D are events with probabilities given by $P(C) = 0.4$, $P(D) = 0.3$ and $P(C \cap D) = 0.1$. What is $P(C \cup D)$?

   (a) 0.6

   (b) 0.5

   (c) 0.4

   (d) 0.3

4. A mystery box has 3 prizes and 3 duds, all of which are unmarked. Contestants pick consecutively from the box. If the first and second persons both got a dud, what is the probability that the third will also get a dud?

   (a) $\frac{1}{2}$

   (b) $\frac{1}{4}$

   (c) $\frac{1}{3}$

   (d) $\frac{2}{3}$

5. Out of 100 infected people, a test fails to detect 15. This same test falsely detects 5 people as "infected" (out of 100 uninfected) even though they are not. What is the probability of a false negative under this test?

   (a) 0.05

   (b) 0.15

   (c) 0.85

   (d) 0.95

6. $ln(x) = log_a(x)$ for $a =$

(a) 0

(b) 1

(c) e

(d) 10

7. If the width of a rectangle stays the same and the height is multiplied by c

   (a) the area stays the same

   (b) you add c to the area

   (c) the area is multiplied by c

   (d) the area is multiplied by c^2

8. What is the antiderivative of e^{3x}?

   (a) $\frac{1}{3}e^{3x}$

   (b) e^{3x}

   (c) $3e^{3x}$

   (d) e^x

9. $\int p^{-1}dp =$

   (a) $-p^{-2}$ + C

   (b) $ln(|x|) + C$

   (c) $ln(|p|) + C$

   (d) $p^1 + C$

10. What is the antiderivative of $sin(5x)$?

    (a) $5cos(5x)$

    (b) $-5cos(5x)$

    (c) $cos(5x)/5$

    (d) $-cos(5x)/5$

Short Answer Questions

1. Determine in the following cases whether the events are independent, mutually exclusive or neither.

   (a) $P(A) = 0.3$, $P(B) = 0.5$, $P(A \cap B) = 0$

   (b) $P(C) = 0.2$, $P(D) = 0.5$, $P(C \cap D) = 0.1$

   (c) $P(E) = 0.2$, $P(F) = 0.8$, $P(E \cap F) = 0.1$

   (d) $P(G) = 0.4$, $P(H) = 0.3$, $P(G \cup H) = 0.58$

   (e) $P(I) = 0.3$, $P(J) = 0.3$, $P(I \cup J) = 0.45$

2. The typical response rate for a telephone survey is about 5% i.e. out of 100 households contacted via telephone, about 5 agree to take the survey. We can assume that each household's response is independent of the others.

   (a) What is the probability that the first household that an interviewer contacts refuses to take the survey?

   (b) What is the probability that the first two households that an interviewer contacts both refuse?

   (c) What is the probability that the first household that agrees is the fourth one on the interviewer's list?

   (d) Suppose the interviewer phoned 10 households and none of them agreed. What is the probability that the eleventh household will agree?

   (e) What is the probability that if the interviewer phones 4 households, at least one will agree?

3. A group of 200 people were asked whether they watched CNN or Fox News. Among the group, 120 said they watched CNN, 60 said they watched Fox News and 20 said they watched both.

   (a) Depict this data using a Venn diagram.

   (b) What is the probability that a person selected at random from the group watches CNN?

   (c) What is the probability that a person selected at random from the group watches both CNN and Fox News?

   (d) What is the probability that a person selected at random from the group watches neither CNN nor Fox News?

   (e) Suppose we know that a person watches CNN. Conditional on this, what is the probability that he/she does not watch Fox News?

   (f) Suppose we know that a person watches Fox News. Conditional on this, what is the probability that he/she also watches CNN?

4. In a research study on smoking and mortality, 5% of the participants reported as being heavy smokers when young, 25% as light smokers, and 70% as non-smokers. In the five-year study, it was determined that the death rate among heavy smokers was 0.2, that among light smokers was 0.1, while that among nonsmokers was 0.05. Suppose a randomly selected participant dies over the period of the study. What is the probability that this person had been (i) a heavy smoker when young, (ii) a light smoker when young?

5. Rewrite the logarithmic expression $\log(A\sqrt{B})+\log(A^2)$ in equivalent logarithmic form. There may be more than one correct answer.

6. A new Youtube channel currently has 12 subscribers. But its creator is very optimistic and expects that the number of subscribers will grow exponentially, tripling every 10 days. How long will it take (in days) for there to be 110 subscribers?