MATH 210 EXAM 1 FORM A Sept 26, 2014

Name (printed) _____ Section _____

Name (signature) _____ ZID No. _____

INSTRUCTIONS:

(1) Use a No. 2 pencil.
(2) Work on this test. Use the back for scratch paper.
(3) Write your name and ZID number on your answer sheet, filling in the ovals.
(4) Write your recitation section in the boxes marked "Section," beginning with a zero:
01 = Tues 1–2 02 = Tues 2–3 03 = Thurs 1–2 04 = Thurs 2–3
(5) This test is Form A and should have a RED answer sheet. Fill in A in the oval corresponding to Form number on your answer sheet.
(6) Check that there are 15 questions on your examination form.
(7) Check your scantron carefully for errors and then sign your name on the back.
(8) "NOTA" means "none of the above answers is correct."

Bayes Formula:

Two Variables: $P(A \mid D) = \dfrac{P(A)\,P(D \mid A)}{P(A)\,P(D|A) + P(B)\,P(D|B)}$

Three Variables: $P(A \mid D) = \dfrac{P(A)\,P(D \mid A)}{P(A)\,P(D|A) + P(B)\,P(D|B) + P(C)\,P(D|C)}$

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(1) In how many ways can you rearrange the letters in BANANA ?
(a) $5 \times 4 \times 3$ (b) $6!$ (c) $C(6,3)$ (d) $P(6,3)$ (e) NOTA

(2) A Sudoku row consists of a sequence of nine numbers, ranging between 1 and 9, where *no digit is used twice*. How many possible Sudoku rows are there?
(a) 10^9 (b) 9^9 (c) $9!$ (d) $999,999,999$ (e) NOTA

(3) True or False? Consider the following two statements:

I. $A \cup (B \cap C) = (A \cap B) \cup (A \cap C)$ II. $(A \cap B)^c = A^c \cap B^c$

(a) both I and II are true
(b) I is true, II is false
(c) I is false, II is true
(d) both I and II are false

(4) There are 90 people at a party. Forty are liars, 20 are lawyers, and 15 are both. If A is the set of liars and B is the set of lawyers at the party, find $n\big(A \cap B^{\mathrm{c}}\big)$

(a) 60 (b) 45 (c) 25 (d) 5 (e) NOTA

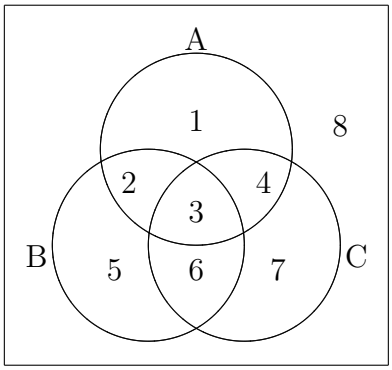
(5) There are four types of small molecules used in genetic coding, represented by their names: adenine (A), cytosine (C), guanine (G), and thymine (T). How many groupings of five moledules are possible?

(a) 4^5 (b) 5^4 (c) $P(5,4)$ (d) $\dfrac{5!}{4}$ (e) NOTA

(6) Which of the following statement(s) are true if A and B are *mutually exclusive* events?

(a) $P(A \cap B) = P(A)P(B)$
(b) $P(A \mid B) = P(B)$
(c) $P(B \mid A) = P(A)$
(d) (a)–(c) are correct
(e) $P(A \cap B) = 0$

(7) Which of the eight regions 1–8 In the following Venn diagram together comprise the set $(A \cap B) \cup C^{\mathrm{c}}$?



(a) 2, 3, 7
(b) 1, 2, 3, 5
(c) 2, 3, 8
(d) 1, 2, 5, 8
(e) 1, 2, 3, 5, 8

(8) Hercule Poirot, a detective, suspect the butler of *murder*. He is 60% sure that the butler is guilty. He then discovers that the murder was committed by a left-handed person and that *the butler is left-handed*. If 10% of all people are left-handed, how does the probability that the butler is guilty change?

(a) $\dfrac{(.6)(0.9)}{(.6)(0.9)+(.4)(.1)}$

(b) $\dfrac{(.6)(1.0)}{(.6)(1.0)+(.4)(.1)}$

(c) $\dfrac{(.4)(.1)}{(.6)(0.9)+(.4)(.1)}$

(d) $\dfrac{0.6}{0.6+(0.4)(0.1)}$

(e) NOTA

(9) A card is drawn from a well-shuffled deck of 52 cards. What is the probability that the card is an ace or a club?

(a) $1-\dfrac{39}{52}\dfrac{12}{13}$ (b) $\dfrac{1}{4}+\dfrac{1}{13}$ (c) $\dfrac{15}{52}$ (d) $\dfrac{16}{52}$ (e) NOTA

(10) Two boxes each contain the numbers 1, 2, and 3. A number x is chosen from the first box and a number y is chosen from the second box. What is the probability that $x+y$ is even?

(a) $\dfrac{1}{2}$ (b) $\dfrac{5}{9}$ (c) $\dfrac{4}{9}$ (d) $\dfrac{1}{3}$ (e) NOTA

(11) An urn contains seven red and three green balls.
A second urn contains five red and five green balls.
A ball is selected at random from the first urn and placed in the second.
Then a ball is selected at random from the second urn.
What is the probability of drawing a green ball the first time and a red ball the second time?

(a) $\dfrac{3}{22}$ (b) $\dfrac{3}{20}$ (c) $\dfrac{7}{22}$ (d) $\dfrac{7}{20}$ (e) NOTA

(12) To gain access to her account, a customer using an automatic teller machine (ATM) must enter a four-digit code. If repetition of the same four digits (for example, 2222 or 5555) is not allowed, how many possible codes are there?

(a) 10^4 (b) $P(10, 4)$ (c) $C(10, 4)$ (d) 9000 (e) 9990

(13) Events E and F occur with the probabilities:

$$P(E) = 0.6 \qquad P(F) = 0.3 \qquad P(E \cap F) = 0.2$$

Compute $P(E \cup F)$ and $P(E \mid F)$ and

(a) $P(E \cup F) = .9, \quad P(E \mid F) = 2/3$
(b) $P(E \cup F) = .7, \quad P(E \mid F) = 2/3$
(c) $P(E \cup F) = .9, \quad P(E \mid F) = 1/2$
(d) $P(E \cup F) = .7, \quad P(E \mid F) = 1/2$
(e) NOTA

(14) True or False? Consider the following two statements:

I. A person participates in a weekly office pool in which she has a one chance in ten of winning the purse. If she participates for 5 weeks in a row, the probability of winning at lease one purse is 5/10.

II. If A is a subset of B, then $P(A) \leq P(B)$.

(a) both I and II are true
(b) I is true, II is false
(c) I is false, II is true
(d) both I and II are false

(15) There is a 15% chance that if you speed through the town of Malta, then your speed will be recorded by radar and you will be given a citation. If you speed through Malta 5 days in a row, what is the probability that you will receive exactly two citations?

(a) $C(5, 2)(.15)^2$
(b) $C(5, 2)(.15)^2(.85)^3$
(c) $(.15)^2(.85^3)$
(d) $C(5, 2)(.15)^3(.85)^2$
(e) NOTA