Stat 100A -Intro Probability
Midterm 1

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MUST DO BEFORE STARTING EXAM

UCLA ID (ALL STUDENTS MUST SHOW UCLA ID. ONLY STUDENTS ENROLLED MAY TAKE THE EXAM): [redacted]

LAST NAME (Please, PRINT): [redacted] (Put ID on your desk)

FIRST NAME: [redacted]

FULL SIGNATURE (In English): [redacted]

(a) WRITE AND MARK YOUR NAME AND ID ON THE SCANTRON. Write on the top the color of your exam.

(b) WRITE YOUR NAME ON BOTH SIDES OF THE CHEAT SHEET.

(c) WRITE YOUR NAME, ID AND SIGNATURE ON THIS PAGE(ABOVE)

(d) DO NOT DETACH ANY PAGES FROM THIS EXAM. EXAM MUST STAY STAPLED DURING THE WHOLE EXAM.

(e) PUT ALL YOUR BELONGINGS INSIDE YOUR BACKPACK UNDER THE CHAIR.

(f) ONLY ID, NUMBER 2 PENCIL AND PEN, ERASER, SCIENTIFIC CALCULATOR, SCANTRON, EXAM AND CHEAT SHEET ALLOWED IN THE EXAM.

(g) PUT DOWN THE TABLES ON YOUR RIGHT AND LEFT. ALL ITEMS MUST BE ON YOUR DESK.

Other important Instructions–Read. Points lost for not following directions.

- Closed books, closed notes. Material covered is up to last day of lecture before the exam.
- Only scientific calculator allowed for computations. You may not use your phone or any other electronic device as calculator. Graphics calculators are not allowed. No exceptions.
- Phones and other electronic devices must be disconnected before you enter the classroom and not turn on again until you are out of the room. While in the classroom, they must be in your backpack and your backpack on the floor. Phones in pockets will lead to big loss of points in the exam. It is not worth the risk.

Question 1

Not yet answered

Points out of 1.00

In 1988 the results of the Physicians' Health Study Research Group study were reported in the *New England Journal of Medicine*. In this study 22 071 male physicians (aged from 40 to 84) were randomly assigned to two groups. One group took an aspirin every second day and the other group took a placebo, a pill with no active ingredient which looked just like an aspirin. The participants did not know whether they were taking aspirin or the placebo.

After five years the number of participants in each group who had had a heart attack was recorded. The results are shown in the table below.

Treatment	Heart attack	No heart attack	Total
Aspirin	104	10 933	11 037
Placebo	189	10 845	11 034
Total	293	21 778	22 071

For those in the aspirin group: the risk of having a heart attack is

Select one:

- a. 0.1891
- b. 0.004712066
- c. 0.9905771
- d. 0.3549488
- e. 0.00942285

Question 2

Not yet answered

Points out of 1.00

If I draw 4 cards from a deck of 52 cards without replacement, where there are 26 black cards and 26 red cards, what is the probability that they all are black?

$$\frac{26}{52} \cdot \frac{25}{51} \cdot \frac{24}{50} \cdot \frac{23}{49}$$

Select one:

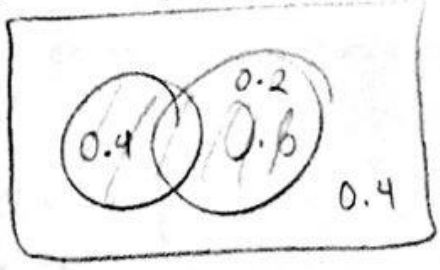
- a. 0.3314
- b. 0.0000009536
- c. 0.0625
- d. 0.05522209
- e. 0.5

Question 3

Not yet answered

Points out of 1.00

You are given $P(A \cup B) = 0.6$ and $P(A \cup B^c) = 0.8$. Determine $P(A)$



Select one:

- a. 0.9
- b. 0.6
- c. 0.4
- d. 0.1
- e. 0.7

Question 4

Not yet answered

Points out of 1.00

A system with 6 independent components is such that the system will fail if at least one of the individual components fail. The probability that a component fails is 0.02. Let A be the event that the system fails. What is the probability of A?

$1 - (0.98)^6$

Select one:

- a. 0.8858424
- b. 0.6672142
- c. 0.511
- d. 0.999999
- e. 0.1141576

Question 5

Not yet answered

Points out of 1.00

In a computer installation, 200 programs are written each week, 120 in C++ and 80 in Java. 60% of the programs written in C++ compile on the first run and 80% of the Java programs compile on the first run.

What is the probability that a program chosen at random is written in C++ and compiles on the first run?

	F	F^c	Total
C++	0.36	0.24	0.6
Java	0.32	0.08	0.4
Total	0.68	0.32	1

Select one:

- a. 0.68
- b. 0.9231
- c. 0.80
- d. 0.5294
- e. 0.36

Question 6

Not yet answered

Points out of 1.00

An appliance dealer sells three different models of upright freezers having 13.5, 15.9, and 19.1 cubic feet of storage space, respectively. Let X = the amount of storage space purchased by the next customer to buy a freezer. Suppose that X has pmf (probability mass function)

x	13.5	15.9	19.11
P(x)	0.2	0.5	0.3

$E(X) = 13.5(0.2) + 15.9(0.5) + 19.11(0.3)$

$= 16.383$

If the price of a freezer having capacity X cubic feet is $17X + 180$, what is the expected price paid by the next customer to buy a freezer?

$E(Y) = 17E(X) + 180$

Select one:

- a. 278.46
- b. 12.15
- c. 458.511
- d. 1002.44
- e. 16.383

Question 7

Not yet answered

Points out of 1.00

A gambling book recommends the following "winning strategy" for the game of roulette. It recommends that a gambler bet $1 on red.

If red appears (which has probability 18/38), then the gambler should take her 1 dollar profit and quit. If the gambler loses this bet (which has probability 20/38 of occurring), she should make additional 1 dollar bets on red on each of the next two spins of the roulette wheel and then quit. Let X denote the gambler's winnings when she quits. What is the expected value of X^2?

	red
W	$\frac{18}{38}$
L	$\frac{20}{38}$

X	1	0	-1
P(X)	$\frac{18}{38}$	$\frac{20}{38}\cdot\frac{18}{38}$	$\frac{20}{38}\cdot\frac{20}{38}\cdot\frac{18}{38}$

$E(X) = 0.3424647$

Select one:

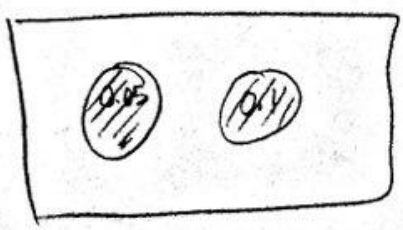
- a. 2.16635
- b. 10.112091
- c. 0.9811
- d. -0.1080331
- e. 0.1325

Question 8

Not yet answered

Points out of 1.00

A certain firm produces resistors and markets them as 10-ohm resistors. However, the actual ohms of resistance produced by the resistors may vary. Research has established that 5 percent of the values are below 9.5 ohms and 10 percent are above 10.5 ohms. If two resistors, randomly selected, are used in a system, find the probability that both resistors have actual values between 9.5 and 10.5 ohms.



Select one:

- a. 0.2775
- b. 0.4198
- c. 1.6
- d. 0.7225
- e. 0.0225

Question 9

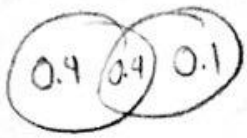
Not yet answered

Points out of 1.00

For events A and B, P(A)=0.8, P(B) = 0.5 and

$P(A \cup B) = 0.9$

Events A and B are:



Select one:

- a. disjoint
- b. Independent
- c. dependent
- d. related
- e. Mutually exclusive

$P(A \cap B) = P(A)P(B)$

$0.4 = (0.8)(0.5)$

$0.4 = 0.4$

Question 10

Not yet answered

Points out of 1.00

Suppose that one half of the messages received at a university are spam.

70% of spam messages contain the sentence: "your participation is required" in the subject line. In messages that are not spam, that sentence only appears 10% of the time in the subject line.

A spam filter, like those in your mail program, is instructed to reject messages that exceed probability

0.8 of being spam.

A message arrives with the sentence "your participation is required" in the subject line. What is the probability that the message is spam?

Select one:

- a. 0.35
- b. 0.5
- c. 0.125
- d. 0.875
- e. 0.4

	Y	Y^C	Total
S	0.35	0.15	0.5
S^C	0.05	0.45	0.5
Total	0.4	0.6	1

Question 11

Not yet answered

Points out of 1.00

Each child born to a particular set of parents has probability 0.25 of having blood type O. If these parents have 5 children, what is the probability that exactly 2 of them have type O blood?

$\binom{5}{2}(0.25)^2(0.75)^3$

Select one:

- a. 0.62
- b. 1.345
- c. 0.732
- d. 0.4562
- e. 0.2636

Question **12**

Not yet answered

Points out of 1.00

Suppose that each child born to a couple is equally likely to be a boy or a girl, independent of the sex distribution of the other children in the family. For a couple having 5 children, compute the probability that all children are of the same sex.

Select one:

- a. 0.0009 $\binom{2}{1}\left(\frac{1}{2}\right)^5$
- b. 0.1209765
- c. 0.0625
- d. 1/2
- e. 0.03125

Question **13**

Not yet answered

Points out of 1.00

Driving to work, a commuter passes through a sequence of three intersections with traffic lights. At each light, she either stops , s, or continues, c. P(s) =0.3. Let Y be the random variable representing the number of intersections where the commuter continues. What is $P(Y \geq 2)$?

Select one:

- a. 0.027
- b. 0.0034
- c. 0.784
- d. 0.343
- e. 0.189

Y	0	1	2	3
P(Y)	$\binom{3}{0}(0.3)^3$	$\binom{3}{1}(0.7)(0.3)^2$	$\binom{3}{1}(0.7)^2(0.3)$	$\binom{3}{3}(0.7)^3$

Question **14**

Not yet answered

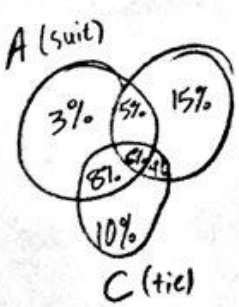
Points out of 1.00

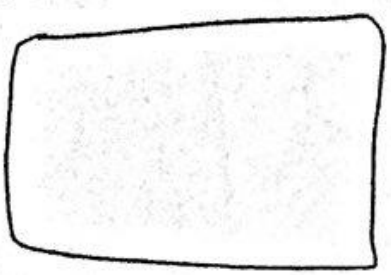
22% of the customers visiting the suit department of a certain store will purchase a suit, 30% will purchase a shirt and 28% will purchase a tie. 11% of customers purchase a shirt and a suit, 14% both a suit and a tie and 10% buy a shirt and a tie. Only 6% of customers buy all three items. Let A be the event that the customer purchases a suit, B the event that the customer purchases a shirt and C the event that the customer purchases a tie. If there are 1000 customers in the store one week, how many will purchase exactly one of these items?

Select one:

- a. 560
- b. 740
- c. 490
- d. 280
- e. 840

22% Suit
30% Shirt
28% tie
11% Shirt and a suit
14% Suit and tie
10% Shirt & tie
6% all





Question 15

Not yet answered

Points out of 1.00

A binary communication channel carries data as one of two sets of signals denoted by 0 (zero) and 1. Owing to noise, a transmitted 0 is sometimes received as a 1, and a transmitted 1 is sometimes received as a 0. For a given channel, it can be assumed that a transmitted 0 is correctly received with probability 0.95 and a transmitted 1 is correctly received with probability 0.75. Also, 70% of all messages are transmitted as a 0. If a signal is sent, determine the probability that a 1 was received.

Select one:

- a. 0.11
- b. 0.687
- c. 0.001
- d. 0.74
- e. 0.26

	C	C^c	
0	0.665	0.035	0.7
1	0.225	0.075	0.3
			1

Question 16

Not yet answered

Points out of 1.00

Someone computed the probability of the event $(E \cup B)(E \cup F)^c$ as being 0.6. Which of the following events has the same probability? (Note: as we have said several times, the given event can be written as $(E \cup B) \cap (E \cup F)^c$ as well.)

Select one:

- a. BE^c
- b. $(E \cup F)^c$
- c. $B(E \cup F)^c$

$E \cup (B \cap F^c)$

$(E \cup B) \cap (E^c \cap F^c)$

$E \cap (E^c \cup$

$B \cup E \cap E^c \cap F^c$

Question 17

Not yet answered

Points out of 1.00

Consider four computer firms A, B, C and D bidding for a certain contract. A survey of past bidding success of these firms shows the following probabilities of winning:

P(A)=0.35; P(B) =0.15; P(C)= 0.3; P(D) = 0.2

Before the decision is made to award the contract, firm B withdraws the bid. Find the new probabilities of winning the bid for A, C,D, respectively.

$\frac{P(A)}{P(C)} = 1.166667$

Select one:

- a. 0.5, 0.25, 0.25
- b. 0.211391, 0.32194, 0.466669
- c. 0.41117647, 0.3529412, 0.232941
- d. 0.35, 0.3, 0.2
- e. 0.33333, 0.33333, 0.33333

$\frac{P(D)}{P(C)} = \frac{0.2}{0.3} = 0.66667$

Question 18

Not yet answered

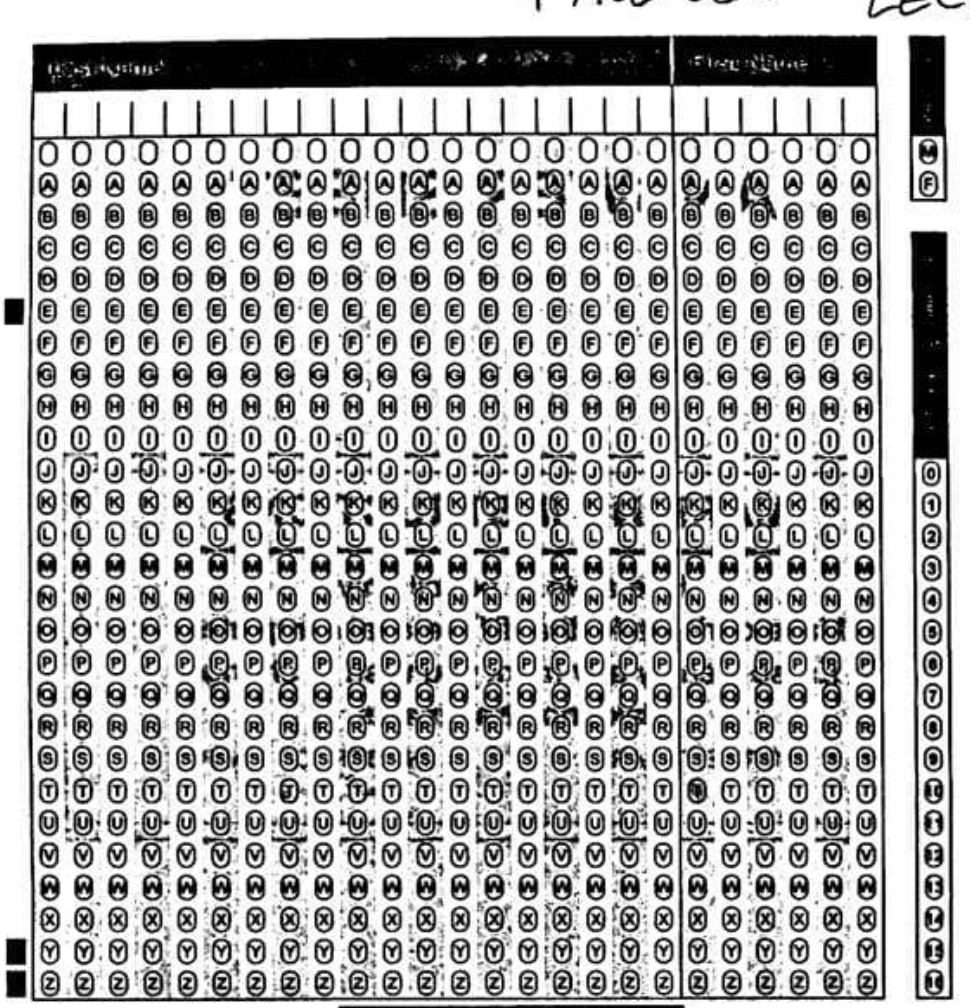
Points out of 1.00

A system consists of two independent components in parallel. The system works if at least one of the components works.
If each component works with probability 0.65, what is the probability that the system works?

Select one:

- a. 0.9991
- b. 0.65
- c. 0.5
- d. 0.8775
- e. 0.3313

FALL 2016 LECTURE 4 PINK.



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2 C	12 C	22	32	42
3 D	13 D	23	33	43
4 E	14 C	24	34	44
5 E	15 E	25	35	45
6 D	16 D	26	36	46
7 A	17 C	27	37	47
8 C	18 C	28	38	48
9 B	19	29	39	49
10 C	20	30	40	50
51	61	71	81	91
52	62	72	82	92
53	63	73	83	93
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58	68	78	88	98
59	69	79	89	99
60	70	80	90	100