

MDM4U Review Questions Day 1

Put your name on the scantron. Do it now.

Use a pencil. Erase fully. Bubbling and erasing errors are your mistakes, not the machine's.

1. What is the set of all possible outcomes of an experiment?
(a) Experimental Likelihood (d) A continuous sample
(b) Probability (e) A sample space
(c) Continuous Probability
2. Which of the following events would have a **discrete** sample space?
(a) The heights of 17 trees.
(b) The length of all the pencils in a pencil case.
(c) Twelve patient's temperatures in a doctor's office.
(d) The times of the top 3 finishers of a race.
(e) The number of female babies born in a hospital, each day, for a week.
3. Which of the following events would have a **continuous** sample space?
(a) The maximum distance that an athlete can throw a javelin.
(b) Drawing a card from a deck
(c) Tossing a coin
(d) Throwing a pair of dice
(e) Pulling out a bingo ball from a set of bingo balls.
4. According to Daniel Kahnman, and other statisticians, which samples are more precise?
(a) Tiny and pin-pointed (b) Small and narrow (c) Average sized (d) Very large
5. According to Daniel Kahnman, which samples have less variation?
(a) Tiny and pin-pointed (b) Small and narrow (c) Average sized (d) Very large
6. An urn is filled with balls, of which $\frac{2}{3}$ are of one colour and $\frac{1}{3}$ are another. One individual (A) has drawn 5 balls from the urn, and found that 4 were red and 1 was white. Another individual (B) has drawn 20 balls and found that 12 were red and 8 were white. Which of the two individuals should feel more confident that the urn contains $\frac{2}{3}$ red balls and $\frac{1}{3}$ white balls, rather than the opposite?
(a) Individual A (b) Individual B (c) Both about the same
7. A town is served by two hospitals. In the larger hospitals about 45 babies are born each day, and in the smaller about 15 babies are born each day. As you know, about 50% of all babies are boys. However, the exact percentage varies from day to day. Sometimes it may be higher than 50%, sometimes lower. For a period of 1 year, each hospital recorded the days on which more than 60% of the babies born were boys. Which hospital do you think recorded more such days?
(a) The larger hospital (b) The smaller hospital (c) About the same (within 5%)
8. What is the Excel symbol for exponents?
(a) * (b) ' (c) > (d) ! (e) None of the previous
9. Which event is more likely: A: you are a hiker who loves the outdoors **OR** B: you are a hiker?
(a) A (b) B (c) Neither (d) Both are equal

10. If $P(H)$ is the probability of selecting a heart from a card deck, what is $P(H')$?
 (a) 0.13 (b) 0.25 (c) 0.6 (d) 0.75 (e) 0.87

11. If $P(A)$ is 0.2 and $P(B)$ is 0.3, and A and B are mutually exclusive, what is $P(A \cap B)$?
 (a) 0 (b) 0.06 (c) 0.1 (d) 0.3 (e) 0.5

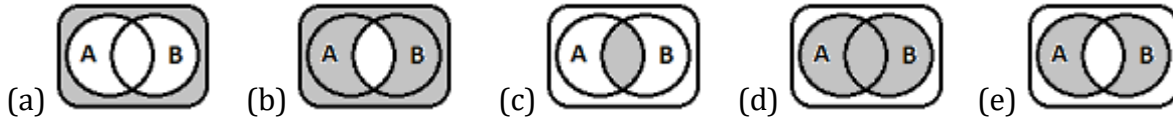
12. If $P(A)$ is 0.2 and $P(B)$ is 0.3, and A and B are independent, what is $P(A \cap B)$?
 (a) 0 (b) 0.06 (c) 0.1 (d) 0.3 (e) 0.5

13. If $P(A)$ is 0.2 and $P(B)$ is 0.3, and A and B are independent, what is $P(A \cup B)$?
 (a) 0 (b) 0.06 (c) 0.44 (d) 0.5 (e) 0.56

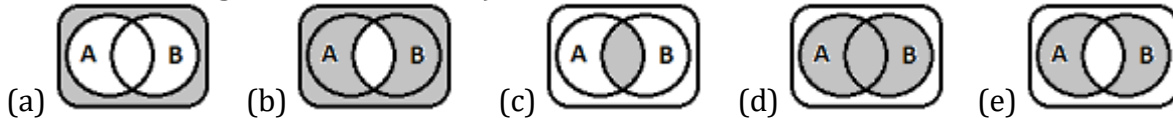
14. If $P(A)$ is 0.2 and $P(B)$ is 0.3, and A and B are independent, what is $P(B|A)$?
 (a) 0 (b) 0.2 (c) 0.3 (d) 0.5 (e) 0.6

15. If $P(A)$ is 0.2 and $P(B)$ is 0.3, and A and B are mutually exclusive, what is $P(B|A)$?
 (a) 0 (b) 0.2 (c) 0.3 (d) 0.5 (e) 0.6

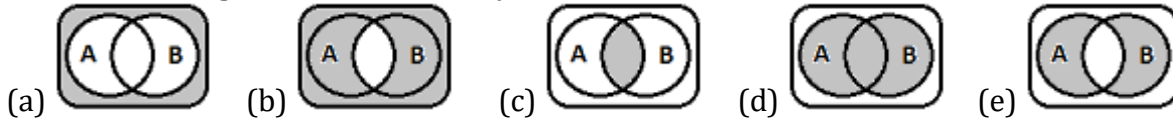
16. Which Venn diagram shows $P(A \cap B)$?



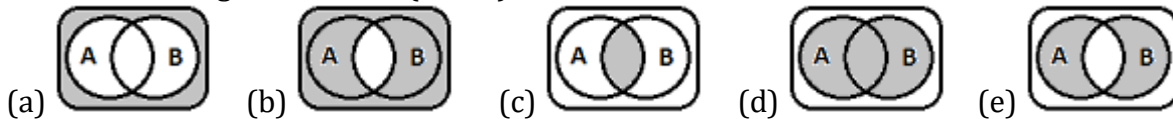
17. Which Venn diagram shows $P(A \cup B)$?



18. Which Venn diagram shows $P(A' \cup B')$?



19. Which Venn diagram shows $P(A' \cap B')$?



20. Which pair of events is independent?

- (a) Student test scores and student attendance
- (b) Student birth order and student backpack colour
- (c) Student participation in sports teams and student mark in gym class
- (d) Student marks and hours of sleep.
- (e) None of the previous.

21. If $P(A)$ is 0.3 and $P(B)$ is 0.4 and $P(A \cap B)$ is 0.1, what is $P(A \cup B)$?
 (a) 0 (b) 0.12 (c) 0.6 (d) 0.7 (e) 0.8

22. Which pair of events is mutually exclusive?

- (a) Event A: It is a sunny day, Event B: It is a hot day
- (b) Event A: Perfect attendance, Event B: Mark over 80%
- (c) Event A: Coin flips a head, Event B: It is a sunny day
- (d) Event A: On track team, Event B: Taking history
- (e) None of the previous pairs are mutually exclusive.

23. Which pair of events is dependent?

- (a) Event A: Gender of first child, Event B: Gender of second child
- (b) Event A: Dealing a card from a shuffled deck, Event B: Dealing a second card from the same deck.
- (c) Event A: Flipping a coin. Event B: Flipping the coin a second time.
- (d) Event A: It is a sunny day, Event B: It is a Tuesday.
- (e) None of the previous pairs are independent.

24. If $P(A)$ is 0.3 and $P(B)$ is 0.5 and $P(A \cap B)$ is 0.2, what do you know about the events?

- (a) Independent (b) Mutually Exclusive (c) Dependent (d) None of the previous

25. If $P(A)$ is 0.4 and $P(B)$ is 0.9 and $P(A \cap B)$ is 0.36, what do you know about the events?

- (a) Independent (b) Mutually Exclusive (c) Dependent (d) None of the previous

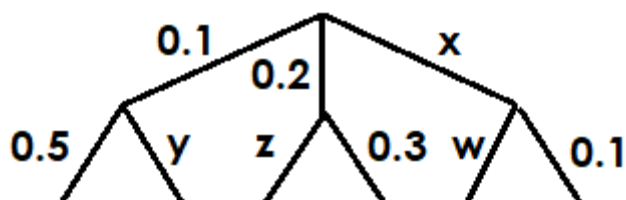
26. If $P(A)$ is 0.1 and $P(B)$ is 0.2 and $P(A \cap B)$ is 0, what do you know about the events?

- (a) Independent (b) Mutually Exclusive (c) Dependent (d) None of the previous

27. Which statement is false?

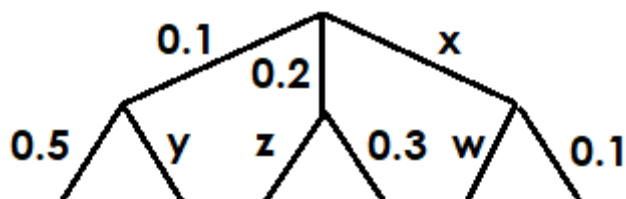
- (a) A pair of events can be independent and non-mutually exclusive.
- (b) A pair of events can be dependent and non-mutually exclusive.
- (c) A pair of events can be independent and mutually exclusive.
- (d) A pair of events can be dependent and mutually exclusive.
- (e) None of the above are false.

28. In this probability tree, what would go in the spot labelled 'x' ?



- (a) 0.1 (d) 0.7
- (b) 0.2 (e) 0.9
- (c) 0.3

29. In this probability tree, what would go in the spot labelled 'z' ?

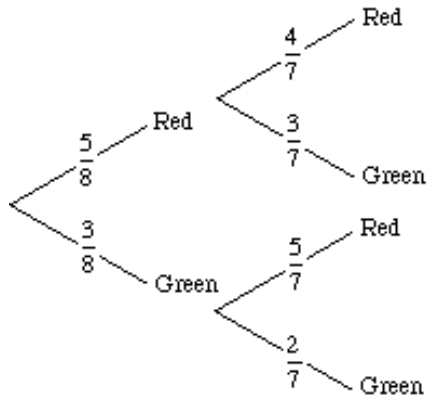


- (a) 0.1 (d) 0.7
- (b) 0.2 (e) 0.9
- (c) 0.3

30. What is the sum all of the probabilities from each branch of a probability tree?

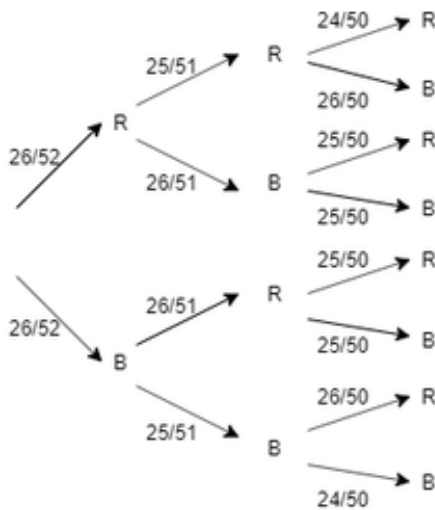
- (a) 0 (b) 0.3 (c) 0.8 (d) 0.99999 (e) 1

31. A student has a bag of red and green marbles. They made this probability tree to represent the process of withdrawing two marbles without replacement. How many marbles were in the bag initially?



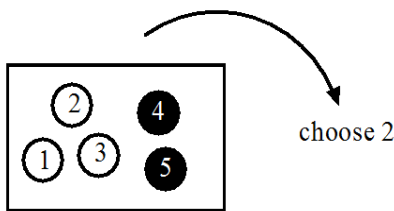
- (a) 2
- (b) 7
- (c) 8
- (d) 15
- (e) 56

32. Three cards are withdrawn from a card deck without replacement. What is the probability that all three are Black (B)?



- (a) 0.1176
- (b) 0.1275
- (c) 0.1276
- (d) 0.5
- (e) 1

33. There is a box that contains 3 white marbles and 2 black ones. If 2 marbles are selected without replacement, what is the probability that both are white?



- (a) 0
- (b) 0.2
- (c) 0.3
- (d) 0.6
- (e) 1

34. If you flip 3 coins, what is the probability that exactly 2 of them are heads?

- (a) 0
- (b) 0.125
- (c) 0.25
- (d) 0.375
- (e) 0.875

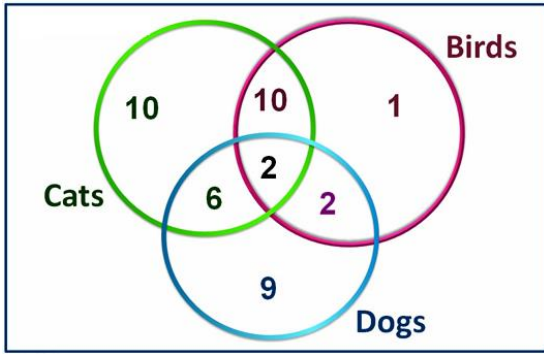
35. If you flip 3 coins, what is the probability that you get 3 heads or 3 tails?

- (a) 0
- (b) 0.125
- (c) 0.25
- (d) 0.375
- (e) 0.875

36. If you flip 3 coins, what is the probability that you get at least one head?

- (a) 0
- (b) 0.125
- (c) 0.25
- (d) 0.375
- (e) 0.875

37. If there were 100 animals, how many are neither cats, nor birds, nor dogs?



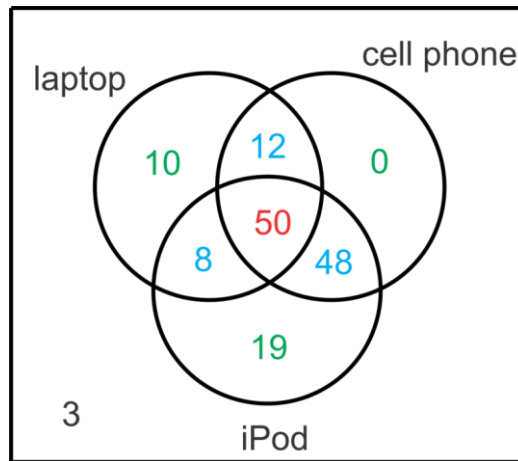
- (a) 10
- (b) 20
- (c) 40
- (d) 50
- (e) 60

38. How many cats are in the above sample?

- (a) 10
- (b) 20
- (c) 28
- (d) 38
- (e) 50

In 2014, a survey was conducted of 150 students at BCSS. They were asked if they had a laptop, cell phone and/or iPod.

The three bubble Venn diagram on the right was created to summarize the results.



39. How many people have a laptop?

- (a) 8
- (b) 10
- (c) 30
- (d) 80
- (e) 150

40. How many people have a laptop, cell phone or iPod?

- (a) 3
- (b) 10
- (c) 120
- (d) 147
- (e) 150

41. What is the probability that a student has a cell phone?

- (a) 0
- (b) 0.33
- (c) 0.4
- (d) 0.5
- (e) 0.73

42. Given a student has a laptop, what is the probability they also have an iPod?

- (a) 0
- (b) 0.464
- (c) 0.725
- (d) 0.775
- (e) 0.86

43. Given that a student has a laptop and an ipod, what is the probability that they have all three devices?

- (a) 1
- (b) 0.06
- (c) 0.489
- (d) 0.806
- (e) 0.86

	A	B	C	D	E	F	G	H	I
1	Date	Steps	Floors	A: Steps >= 10000	B: Floors >= 10	A and B	A or B	B'	A and B'
2	20-Sep-19	14153	5						
3	21-Sep-19	19234	97						
4	22-Sep-19	7854	13						
5	23-Sep-19	5750	4						

44. What is the Excel formula in D2?

- (a) =B2>=10000 (d) =if(A2>=10000, TRUE, FALSE)
 (b) =if(B2>=10000, FALSE, TRUE) (e) =if(A2>= B2, TRUE, FALSE)
 (c) =if(B2<10000, TRUE, FALSE)

45. What is the Excel formula H2?

- (a) =if(C2>=10, TRUE, FALSE) (d) =E2'
 (b) =NOT(C2>=10) (e) =NOT(E2=FALSE)
 (c) =NOT(C2)

46. What is the Excel formula for I2?

- (a) =NOT(AND(D2, NOT(H2))) (d) =AND(D2, NOT(H2))
 (b) =NOT(AND(D2, H2)) (e) =AND(D2, H2)
 (c) =AND(NOT(D2), NOT(H2))

47. How many ways can 8 people stand in a line?

- (a) 8 (b) 56 (c) 70 (d) 5,040 (e) 40,320

48. How many ways can you arrange all the letters in the word COMPUTER?

- (a) 7! (b) 8! (c) 7! ÷ 2! (d) 7P_6 (e) ${}^7C_6 \times 2$

49. How many circular permutations of the letters in the word MAILBOX?

- (a) 5! (b) 6! (c) 7! (d) 7P_7 (e) 7C_7

50. How many ways can you choose 5 swimmers from a team of 10 swimmers?

- (a) 120 (b) 126 (c) 252 (d) 30,240 (e) 3,628,800

51. How many arrangements of the word MATH have T in the first position or in the last position?

- (a) 6 (b) 12 (c) 24 (d) 36 (e) 48

52. From a team of 18 students, how many ways can you pick a captain and assistant captain?

- (a) 2 (b) 18 (c) 153 (d) 306 (e) 18!

53. How many ways can you arrange 10 beads around a ring?

- (a) 9! (b) 10! (c) 10! ÷ 2! (d) ${}_{10}P_2$ (e) ${}_{10}C_2$

54. How many arrangements of the word EXAMS have E in the first position and S in the last position?

- (a) 6 (b) 12 (c) 24 (d) 120 (e) 720

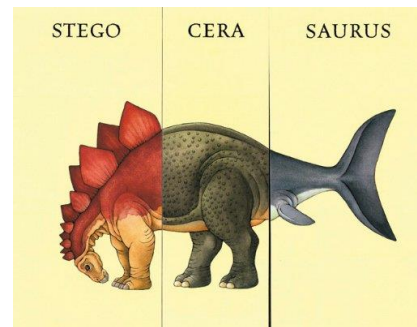
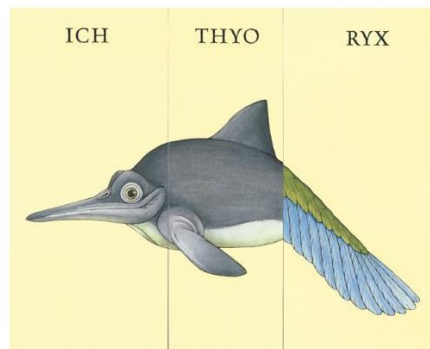


Amberly, Kincardine and Tiverton are three small towns on the shores of Lake Huron. Each town has a certain set of phone numbers assigned to them. The front numbers are fixed for everyone in the town. The digits with boxes can change depending on the person you want to call.

Amberly: 519-397-48□□
 Kincardine: 519-396-□□□□
 Tiverton: 519-395-7□□□

55. Which is the best estimate of Tiverton's size?
 (a) 30 (b) 100 (c) 1,000 (d) 3,000 (e) 30,000
56. Which Lake Huron town has the largest population?
 (a) Amberly (b) Kincardine (c) Tiverton (d) All of the previous (e) Teeswater are equal size

Flip-o-saurus is a book with 10 dinosaurs each divided into three pieces. Children can then flip the pieces of the dinosaurs to make new dinosaurs.

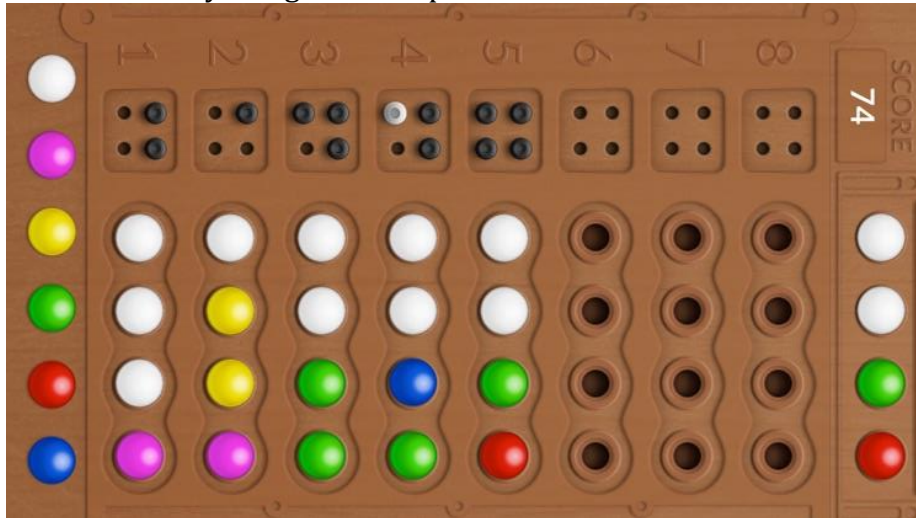


57. How many ways can the dinosaurs in the book be arranged in total?
 (a) $10C_3$ (b) $10!$ (c) $10P_3$ (d) 10^3 (e) $10 \times 9 \times 8$
58. How many flip-o-saurus dinosaurs have two pieces from the same dinosaur?
 (a) 30 (b) 90 (c) 270 (d) 300 (e) 720
59. How many flip-o-saurus dinosaurs have all their pieces from a different dinosaur?
 (a) $3!$ (b) $7!$ (c) $10! \div 3!$ (d) $10P_3$ (e) $10C_3$

60. A class has 12 boys and 8 girls. Four children are chosen to be in a play. What is the probability that there is an equal number of girls and boys chosen?
 (a) 0.38 (b) 0.40 (c) 0.5 (d) 0.52 (e) 616
61. How many permutations of ISOSCELES have S in the first and last position?
 (a) 420 (b) 2520 (c) 5040 (d) 30,240 (e) 362,880

62. How many 3 digit numbers can be made from the digits 0 to 5 if repetition of digits is not allowed?
 (a) 48 (b) 100 (c) 120 (d) 180 (e) 216
63. How many 3 digit numbers can be made from the digits 0 to 5 if repetition of digits is allowed?
 (a) 48 (b) 100 (c) 120 (d) 180 (e) 216
-

The game of Mastermind is clearly designed with permutations and combinations in mind.



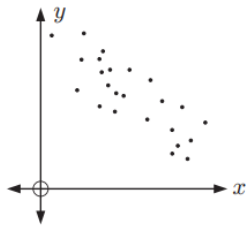
64. How many possible secret codes exist? (There are 6 possible pegs - YGRBWP).
 (a) $6!$ (b) ${}_6P_4$ (c) ${}_6C_4$ (d) 6^4 (e) 36
65. If you guess GGWW, and you are told that all of the colours are correct, but the pins are in the wrong places, how many codes do you need to guess?
 (a) 1 (b) 2 (c) 3 (d) 4 (e) 12
66. If you guess GRYW, and you are told that one colour is entirely wrong and that the three others are in the right place, how many codes do you need to guess?
 (a) 4 (b) 8 (c) 12 (d) 24 (e) 30
-

67. What is the Excel formula for: ${}_{10}P_5$
 (a) =P(10, 5) (d) =Permutation(10, 5)
 (b) =P(5, 10) (e) =Permutation(5, 10)
 (c) =Permut(10, 5)

68. What is the Excel formula for: ${}_9C_4$
 (a) =C(9,4) (d) =Combin(9, 4)
 (b) =C(4, 9) (e) =Combin(4, 9)
 (c) =Combination(9,4)

69. What is the Excel formula for: $6!$
 (a) =6! (d) =F(6)
 (b) =Fact(6) (e) =Factorial(6)
 (c) =6^6

70. Which is the best estimate of r (the correlation coefficient) for this graph?



- (a) -1
- (b) -0.7
- (c) 0.3
- (d) 0.7
- (e) 1

71. If $r = 0.1$, what is the strength of the relationship?

- (a) Weak
- (b) Moderate
- (c) Strong
- (d) No Correlation

72. If $r^2 = 0.5$, what is the strength of the relationship?

- (a) Weak
- (b) Moderate
- (c) Strong
- (d) No Correlation

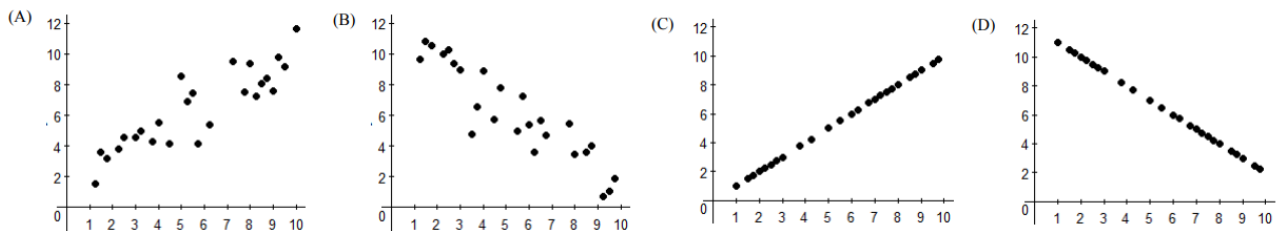
73. If $r^2 = 0.36$, what proportion of the variance of Y can be explained by X ?

- (a) 0.6%
- (b) 3.6%
- (c) 6%
- (d) 36%
- (e) 60%

74. If $r = 0.5$, what proportion of the variance of Y can be explained by X ?

- (a) 0.5%
- (b) 2.5%
- (c) 5%
- (d) 25%
- (e) 0.125%

75. Which of the following scatterplots could represent a data set with a correlation coefficient of $r = 0.85$?



The U.S. Census Bureau's 2013 American Community Survey (ACS) estimates that the proportion of Americans between the ages of 18 and 24 who have not received a high school diploma (or equivalent) is 0.1467. Wilmington, NC (population 112,067) conducted a study in 2015 to see if their proportion is significantly different from the 2013 national proportion. Eight hundred residents between the ages of 18 and 24 were selected at random and it was found that 97 of them had not received a high school diploma or equivalent.

76. Classify the type of the American Community Survey.

- (a) Causal
- (b) Experiment
- (c) Descriptive
- (d) Not this one.
- (e) Not this one either.

77. Identify the replication size in the American Community Survey.

- (a) 18-24
- (b) 14
- (c) 97
- (d) 800
- (e) 112,067

78. What is the problem unit in this situation?

- (a) Americans between the ages of 18 and 24 in 2013.
- (b) The 112,067 residents of Wilmington, NC in 2015.
- (c) The residents of Wilmington, NC between the ages of 18 and 24 in 2015.
- (d) The 800 randomly selected residents of Wilmington, NC in 2015.
- (e) The 112,067 residents of Wilmington, NC in 2013.

79. Classify the sampling type of the American Community Survey.
(a) Convenience (b) Stratified (c) Simple Random (d) Cluster (e) Self-Selection

80. Identify the PPDAC phase which includes this part of the American Community Survey: "Eight hundred residents between the ages of 18 and 24 were selected at random"
(a) Problem (b) Plan (c) Data (d) Analysis (e) Conclusions

81. How do you eliminate spuriousness (common-cause) from your causal analysis?
(a) Sufficient replication; the law of large numbers must be applied.
(b) Random sampling; a representative sample is critical.
(c) Avoid the Hawthorne effect by disguising the true purpose of the study from the subjects.
(d) Verify that the survey questions are free from bias.
(e) Randomly assign the subjects to a control and an experiment group.

82. There is a positive association between the number of drownings and ice cream sales. This is an example of:
(a) correlation (d) induction
(b) cause and effect relationship (e) none of the previous
(c) descriptive study

83. An experiment was designed to investigate the effect of the amount of water and seed variety upon subsequent growth of plants. Each plant was potted in a clay plot, and a measured amount of water was given weekly. The height of the plant at the end of the experiment was measured. Which of the following is not correct?
(a) The dependent variable is the plant height.
(b) The independent variables are the amount of water and seed variety.
(c) Randomization was used to eliminate the effect of other possible factors upon the growth of the plants.
(d) A possible uncontrollable factor in this experiment is any nutrients that might be present in the clay pots.
(e) Experiments give the best evidence of "cause-and-effect" relationships.

The American Academy of Pediatrics advises against feeding babies solid foods before they reach 4 months old. A research group obtains a simple random sample of 5,000 mothers nationwide and mails each one a survey asking questions about their feeding practices. Of the 1,000 mothers who completed the survey and mailed it back, 40% indicated that they started feeding their baby solid foods before age 4 months. A newspaper reports on the study with the headline, "Infants are Fed Solid Foods Too Soon."

84. Classify the type of this study.
(a) Causal (b) Experiment (c) Descriptive (d) Lots of Fun (e) Super Awesome

85. How much replication in the Pediatric Study?
(a) 4 (b) 40 (c) 1000 (d) 5000 (e) 6000

86. Identify the PPDAC phase which includes this part of the Pediatric study: "mails each one a survey asking questions about their feeding practices"
(a) Problem (b) Plan (c) Data (d) Analysis (e) Conclusions

87. Identify the PPDAC phase which includes this part of the Pediatric study: "40% indicated that they started feeding their baby solid foods before age 4 months"
- (a) Problem (b) Plan (c) Data (d) Analysis (e) Conclusions
88. Was there any random assignment in the Pediatric Study?
- (a) Yes, when the surveys were mailed.
(b) Yes, when the sample of 5,000 mothers was selected.
(c) Yes, when 1,000 mothers completed the survey.
(d) Yes, when 40% indicated the start of feeding baby solid food.
(e) None of the previous are correct.
89. What was the thesis of the Pediatric Study?
- (a) As education increases, mothers provide better care for their babies.
(b) As time has progressed, mothers have started feeding their infants solid foods too soon.
(c) What is the average date that mothers feed their infants solid foods?
(d) If mothers feed their infants solid foods before 4 months, it is too soon.
(e) None of the previous are a thesis statement.
90. Which of the following is the most serious concern regarding of the Pediatric Study?
- (a) There was no control group.
(b) There could be a serious non-response bias.
(c) The sample size was too small.
(d) There was no random assignment.
(e) The sampling design did not incorporate stratification.