Answers to Chapter 10 Exercises

1. Questions without an answer have answers in the back of the text book.

2. If Dr. Jones uses a random method to select when the quizzes are, then Monday is as likely as any other day for a quiz. The random processes does not / cannot remember which day was selected on previous occasions, and which days were selected cannot influence which day is selected this time. This is an example of the gambler's fallacy.

3.

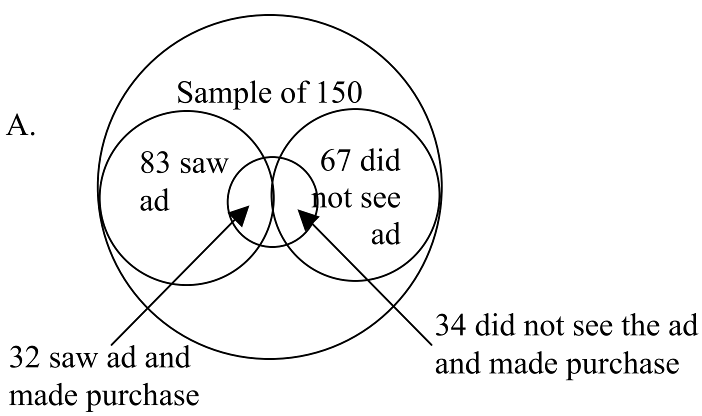
4. No – Alex Jr.'s argument is invalid. Just because other people without a college education have been successful is no guarantee that Alex Jr. will be successful. This is an example of a "Man-Who Statistic."

5.

6.
   A. This is not a random sample. To be random, everyone must have an equal chance of being selected and the selection of one person cannot influence the selection of anyone else. In this example, the first, second, third, and fourth people have a probability of 0 of being selected, while the fifth person has a probability of 1 of being selected.
   B. This is not a random sample. Once the evening has been selected (at random) none of the viewers on other evenings can be selected. Thus, the selection of one person (from the night being sampled) influences the selection of another person (from the nights not being sampled.)
   C. This is not a random sample. Once the first student in a class has been selected, all the remaining students in the class cannot be selected. Thus, the selection of one person influences the selection of other people.
   D. Random (assuming that all people who were called answered the survey.)

7.

8.
   A.



   B. p(saw the ad) = 83 / 150 = .55 (55%)
   C. p(purchase) = 66 / 150 = .44 (44%)

D. p(saw ad and purchase) = p(saw) X p(purchase | saw) = (83 / 150) X (32 / 83) = .21 (21%)
E. p(did not see ad and purchase) = p(did not see ad) X p(purchase | did not see ad) = (67 / 150) X (34 / 67) = .23 (23%)

9.

10.

	Aggression Prior to Marriage	No Aggression Prior to Marriage	Marginal Probabilities
Aggression After 30 Months of Marriage	37 / 272 = .136	31 / 272 = .114	68 / 272 = .250
No Aggression After 30 Months of Marriage	47 / 272 = .173	157 / 272 = .577	204 / 272 = .750
Marginal Probabilities	84 / 272 = .309	188 / 272 = .691	272

A.
B. p(Aggression after 30 months of marriage | Aggression prior to marriage) = p(Aggression after 30 months of marriage and Aggression prior to marriage) / p(Aggression prior to marriage) = .136 / .309 = .440
C. p(Aggression prior to marriage | Aggression after 30 months of marriage) = p(Aggression prior to marriage and aggression after 30 months of marriage) / p(Aggression after 30 months of marriage) = .136 / .250 = .544

11.

12.

	No Record	Conviction	Marginal Probabilities
Truth Teller	204 / 306 = .667	12 / 306 = .039	216 / 306 = .706
Liar	69 / 306 = .225	21 / 306 = .068	90 / 306 = .294
Marginal Probabilities	273 / 306 = .892	33 / 306 = .108	306

A.
B. p(truth teller | no record) = p(truth teller and no record) / p(no record) = .667 / .892 = .747
C. p(no record | truth teller) = p(no record and truth teller) / p(truth teller) = .667 / .706 = .944

13.

14.

	Regular Test Positive	Regular Test Negative	Marginal Probabilities
New Test Positive	110 / 385 = .286	44 / 385 = .114	154 / 385 = .400
New Test Negative	30 / 385 = .078	201 / 385 = .522	231 / 385 = .600
Marginal Probabilities	140 / 385 = .364	245 / 385 = .636	385

A. p(new test positive | regular test positive) = p(new test positive and regular test positive) / p(regular test positive) = .286 / .364 = .786
B. p(new test negative | regular test positive) = p(new test negative and regular test positive) / p(regular test positive) = .078 / .364 = .214
C. p(new test correct) = p((new test positive and regular test positive) or (new test negative and regular test negative)) = p(new test positive and regular test positive) + p(new test negative and regular test negative) = .286 + .522 = .808

15.

16.

	0	1	2	3	4	5	6	7
Freq.	1	5	35	45	23	12	3	1
p	1/125= .008	5/125= .040	35/125= .280	45/125= .360	23/125= .184	12/125= .096	3/125= .024	1/125= .008

A.
B. p(3 or more changes) = p(3 changes) + p(4 changes) + p(5 changes) + p(6 changes) + p(7 changes) = .360 + .184 + .096 + .024 + .008 = .672
C. p(at least 2 changes) = p(2 changes) + p(3 or more changes) = .280 + .672 = .952
D. p(changed between 2 and 4 times (inclusive)) = p(2 changes) + p(3 changes) + p(4 changes) = .280 + .360 + .184 = .824
E. Mean number of changes = (1 X 0 + 5 X 1 + 35 X 2 + 45 X 3 + 23 X 4 + 12 X 5 + 3 X 6 + 1 X 7) / 125 = 387 / 125 = 3.096
F. These data are slightly skewed positively

17.

18.

Remember:
unit normal distribution is symmetrical (area below a given –z = area beyond a given z)
area under unit normal distribution = 1 (area below a given z = 1 – area beyond a given z)

19.

A. .1915
B. .4332
C. .1151
D. 1 - .1151 = .8849
E. .0548

F. 1 - .0548 = .9452
G. between –1.00 and mean = .3413
between mean and .5 = .1915
between –1 and .5 = .3413 + .1915 = .5328
H. between –1.65 and mean = .4505
between mean and .5 = .1915
between –1.65 and .5 = .4504 + .1915 = .6420
I. between –1.96 and mean = .4750
between mean and .5 = .1915
between –1.96 and .5 = .4750 + .1915 = .6665

20.

21.
A. .0013
B. 1 - .0228 = .9772
between –2 and mean = .4772
between mean and infinity = .5
greater than –2 = .4772 + .5 = .9772
C. .0250
D. 1 - .1587 = .8413
E. .5
F. .5 + .4750 = .9750

22.

23.
A. between –1.65 and –1.64
B. between –0.85 and -0.84
C. between 0.67 and 0.68
D. between 1.28 and 1.29
E. –1.65 and 1.65
F. -0.32 and 0.32

24.

25.
A. z = (150 – 500) / 100 = -3.5. Area above z = -3.5 equals 1 - .0002 = .9998
B. z = (550 – 500) / 100 = 0.5 Area below z = 0.5 equals .3085
C. 45^{th} percentile corresponds to z = -0.13. (score – 500) / 100 = -0.13 score = 487
D. z = (664 – 500) / 100 = 1.64 Area below z = 1.64 equals 0.5 + .4495 = .9495 = 95^{th} percentile
E. z = (405 – 500) / 100 = 0.95 Area below z = 0.95 equals .1711 = 17^{th} percentile
F. 25^{th} percentile corresponds to z = -0.68 75^{th} percentile corresponds to z = 0.68
(score – 500) / 100 = -0.68, score = 432 (25^{th} percentile)
(score – 500) / 100 = 0.68, score = 568 (75^{th} percentile)