Statistics : Practice Final Exam

Solutions

1. D
2. C
3. D
4. B
5. C
6. D
7. D The sum of the frequencies is 309. Obtain the relative frequencies by dividing each frequency by 309 and multiplying by 100%.
8. C
9. A
10. B

The extreme low values pull the mean away from the center.

11. A The entire data set is

1, 1, 2, 2, 2, 2, 2, 2, 2, 3, 3, 3, 4, 4, 4, 5, 5, 6, 7

The median is the number in the middle of an ordered data set: 3.

12. A
13. B min = 5.5

max = 8.7

median = avg of two middle numbers $= \frac{7.0+7.0}{2} = 7.0$

Q_1 = median of lower half of data = 6.4

Q_3 = median of upper half of data = 7.7

14. C
15. B

16. A $P(\text{red on 1st draw and red on 2nd draw}) = \left(\frac{5}{25}\right)\left(\frac{4}{24}\right) = \frac{20}{600} = 0.033$

17. A $P(\text{head on 1st toss and head on 2nd toss}) = \left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4}$

18. A $P(\text{accident involved one car } \underline{\text{or}} \text{ accident involved two cars}) = \frac{83}{400} + \frac{265}{400} = \frac{348}{400} = 0.870$

(or: mutually exclusive events)

19. C $P(\text{female driver}) = \frac{170}{400} = 0.425$

20. C $P(\underbrace{\text{female, given 3 or more cars involved}}_{\text{conditional probability}}) = \frac{19}{52} = 0.365$

Notice that the denominator is not the grand total (400)

21. A $P(\text{male or 1 car}) = P(\text{male}) + P(1\text{ car}) - P(\text{male and 1 car})$

$= \frac{230}{400} + \frac{83}{400} - \frac{25}{400} = \frac{288}{400} = 0.720$

(or: not mutually exclusive events)

22. B The probabilities must sum to one.

23. A $\mu = \Sigma x P(x)$

x	$P(x)$	$xP(x)$
10,000	0.10	1,000
30,000	0.15	4,500
70,000	0.50	35,000
90,000	0.15	13,500
100,000	0.10	10,000

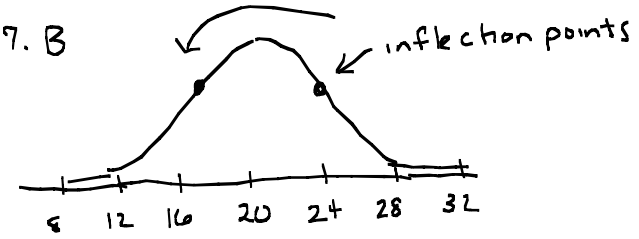
$\mu = 64{,}000$

24. B For a binomial random variable, $\mu = np = 10(0.20) = 2$

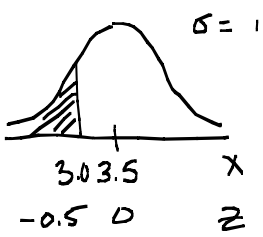
25. C Use the binomial probability formula or the table with $n = 10$, $p = 0.20$, and $X = 2$

26. D Use the binomial probability formula or the table with $n = 10$, $p = 0.20$, and $X = 0, 1,$ and 2. Add the probabilities together.

27. B



28. B



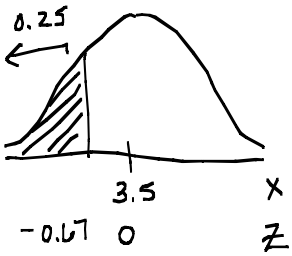
$P(x < 3.0) = P(z < -0.5) = 0.3085$ ← From negative z-table.

$z = \frac{x - \mu}{\sigma} = \frac{3 - 3.5}{1} = -0.5$

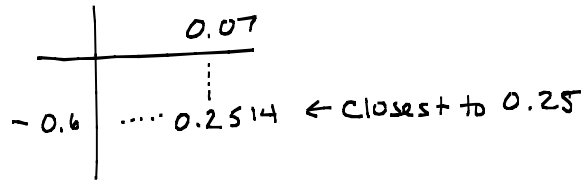
29. B This is the complement of the event in question 28.

$P(z > 3.0) = 1 - P(z < 3.0) = 1 - 0.3085 = 0.6915$

30. B



The 25th percentile in terms of a z score is −0.67.



Convert this to a time (x).

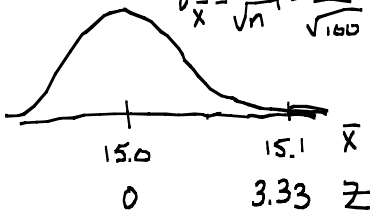
$X = \mu + z\sigma = 3.5 + (-0.67)(1)$

$= 2.83$ minutes

31. A (Note that the standard error is $\frac{\sigma}{\sqrt{n}} = \frac{25}{\sqrt{100}} = 2.5$)

32. D

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{0.3}{\sqrt{100}} = 0.03$



$P(\bar{x} > 15.1) = P(z > 3.33) = 1 - 0.9996 = 0.0004$

$z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}} = \frac{15.1 - 15}{0.03} = 3.33$

33. C

34. B

35. A sample proportion $= p' = \frac{2250}{4000} = 0.563$

36. C $p' \pm Z_{\alpha/2}\sqrt{\frac{p'q'}{n}} \rightarrow 0.563 \pm 1.645\sqrt{\frac{(0.563)(0.437)}{4000}} \longrightarrow 0.563 \pm 0.013$

37. A A point estimate of the population mean is the sample mean $\bar{X}$.

38. D $\bar{x} \pm t_{\alpha/2}\frac{s}{\sqrt{n}} \rightarrow 72.3 \pm 1.684\frac{2.5}{\sqrt{41}} \rightarrow 72.3 \pm 0.7$

↑ From the t table with d.f. = 40

39. C $\bar{x} \pm z_c\frac{\sigma}{\sqrt{n}} \longrightarrow 219.0 \pm 1.96\frac{16.8}{\sqrt{74}} \longrightarrow 219.0 \pm 3.8$

40. D

41. D (right-tailed test)

42. D The population standard deviation is unknown. Only the sample standard deviation s is known

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{31.4 - 30}{4.2/\sqrt{45}} = 2.24$$

43. A

44. D

45. A $p' = 15/200$

$$z = \frac{p' - p}{\sqrt{\frac{pq}{n}}} = \frac{0.075 - 0.063}{\sqrt{\frac{(0.063)(0.937)}{200}}} = 0.698$$

46. C

47. A

48. B

49. C

50. A

51. A

52. D

53. D

54. D

critical value from table.

r is not significant because $|r| < 0.361$.

$\hat{y} = 1.91(34) + 5.50 = 70.44$