Math 102 Answers for Test2

1. a) $\mu_{\bar{x}} = 23{,}000$ miles

   b) $\sigma_{\bar{x}} = \dfrac{2500}{\sqrt{4}} = 1250$ miles

   c) $P(\bar{x} < 20000) = P\left(z < \dfrac{20000-23000}{2500/\sqrt{4}}\right) = P(z < -2.40) = .0082$

2. a. F
   b. T
   c. F
   d. T

3.a) $n\pi = 100(.453) = 45.3 \geq 10$ and $n(1-\pi) = 100(1-.453) = 54.7 \geq 10$

b) $\mu_p = .453$

c) $\sigma_p = \sqrt{\dfrac{.453(1-.453)}{100}} = .0498$

d)

$$P(p < .403\ or\ p > .503) = P\left(z < \frac{.403-.453}{\sqrt{\frac{.453(1-.453)}{100}}}\right) + P\left(z > \frac{.503-.453}{\sqrt{\frac{.453(1-.453)}{100}}}\right)$$

$$= P(z < -1) + P(z > 1) = .1587 + .1587 = .3174$$

4.The 6 possible samples include 2 and 2, 2 and 4, 2 and 5, 2 and 4, 2 and 5, 4 and 5.
The distribution of $\bar{x}$ is:

| $\bar{x}$ | 2 | 3 | 3.5 | 4.5 |
|---|---|---|---|---|
| $P(\bar{x})$ | 1/6 | 2/6 | 2/6 | 1/6 |

5. a. F

b. F

c. F

d. F

6.a) P(**BAC**) = P(**B**) P(**A**) P(**C**) = (.35)(.30)(.25) = 0.02625
b) P(**CFF**) = P(**C**) P(**F**) P(**F**) = (.25)(.01)(.01) = 0.000025
c) P(**ABA**) = P(**A**) P(**B**) P(**A**) = (.30)(.35)(.30) = 0.0315

7. a) area of trapezoid: $P(x<1)=\frac{1}{2}(1)\left(\frac{3}{8}+\frac{1}{2}\right)=\frac{7}{16}=0.4375$

b) area of trapezoid: $P(2<x<3)=\frac{1}{2}(1)\left(\frac{1}{8}+\frac{1}{4}\right)=\frac{3}{16}=0.1875$

c) area of triangle: $P(x\geq 3)=\frac{1}{2}(1)\left(\frac{1}{8}\right)=\frac{1}{16}=0.0625$

8. a) $\mu_F=\mu\left(\frac{9}{5}C+32\right)=\frac{9}{5}\mu_C+32=62.6^{\circ}F$

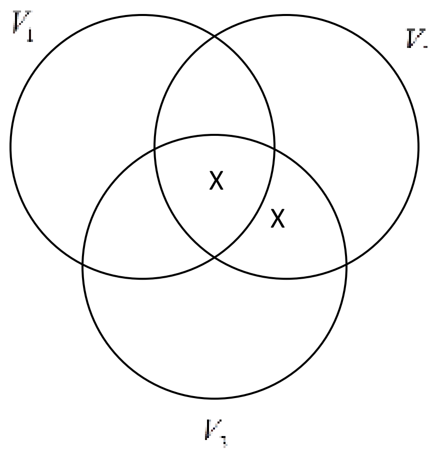
b) $\sigma_F=\sigma\left(\frac{9}{5}C+32\right)=\frac{9}{5}\sigma_C=5.4^{\circ}F$

9. P(X < 11.7) = P(z <(11.7 – 12)/0.2) = P(z < -1.5) = .0668

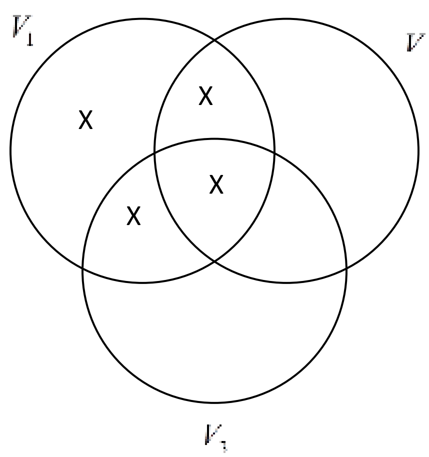
10. a) 0.0901
b) 0.9948
c) 0.8664
d) $z$ = -1.645
e) $z$ = -1.645 to $z$ = 1.645

11. a. F
b. F
c. F
d. F

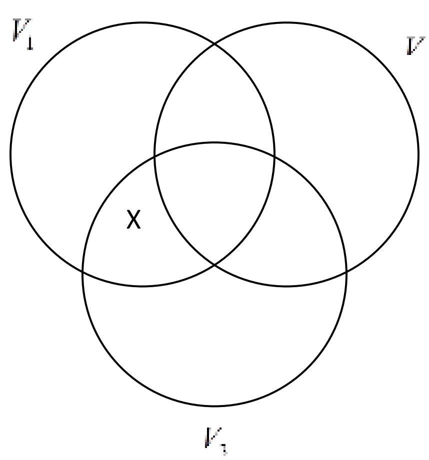
12. a)



b)



c)



13. a) $\frac{10}{25}$

b) $\frac{15}{25}$

c) $\frac{18}{25}$

d) $\frac{8}{25}$

14. a)

| | Speed Limit<br>> 25mph<br>"F" | Speed Limit<br>25mph or less<br>"not F" |
|---|---|---|
| **Driver speeding** | .316 | .482 |
| **Driver not speeding** | .185 | .017 |

b) .983
c) .396
d) .798
e) .316

15. a) .028 b) .931 c) .036

16. a. T

b. T

c. F

d. F

17. a) $r = 0.459$

b) $\boxed{Fore = 435.83 + 0.297Hind}$

c) $\boxed{\begin{aligned} Fore &= 435.83 + 0.297\,Hind \\ &= 435.83 + 0.297(500) \\ &= 584.33 \end{aligned}}$

18. a) Points on the graph lined up in a pattern that is consistently increasing or decreasing, rather than curved.

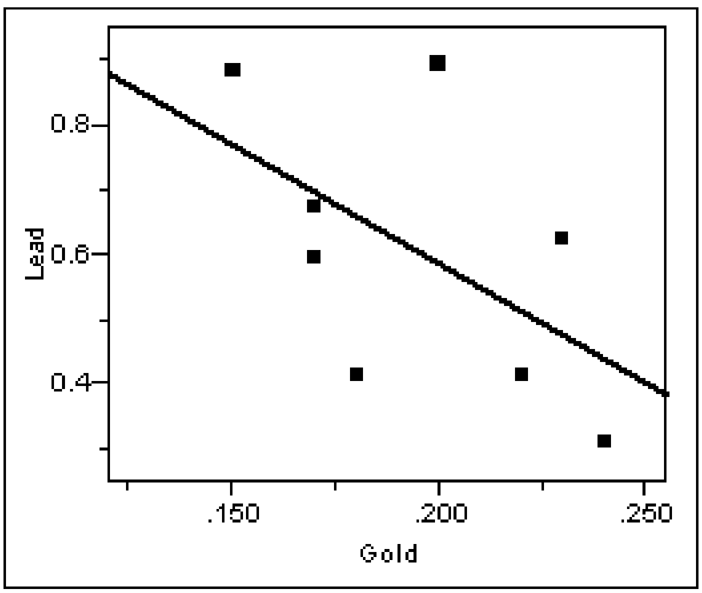
b) Values of $r$ that are close to –1 or 1.

c) Small value of the standard deviation of the residuals (close to zero).

d) Value of $r^2$ close to 1.

19. a) $\hat{L} = 1.306 - 3.635G$, where $L$ is the % lead content and $G$ is the % gold content.

b) graph with regression line:




c) $r = -0.549$. This indicates a moderately negative linear relationship between %Lead and %Gold.

d) $r^2 = 0.302$. About 30% of the differences in lead content can be explained by differences in the gold content.

d) $\hat{L} = 1.306 - 3.635(.20) = 0.579\%$ lead

e) residual = $L_i - \hat{L} = 0.89 - 0.579 = 0.311\%$

f) The regression line shows how the lead and gold content of coins in Rome are related. If a coin of unknown origin is added to the scatter plot and the point for the new coin were far from the line, it would suggest that it was not produced in Rome.

20. a) $\hat{E} = 11.476 + 0.181(124.5 + 19) = 37.4cm$

*or* if a point is 1 standard deviation above the mean height, it should be 0.995 standard deviations above the mean esophagus length:

$$\hat{E} = 34 + 0.995(3.5) = 37.5cm$$

b) $r^2 = (0.995)^2 = 0.9900$. About 99% of the variance is accounted for by the height of the children and adolescents.

c) Since 99% of the variance is accounted for by the height in the prediction, the predictions should be very accurate, compared to the variability of the esophageal length. To assess the prediction in any absolute sense we would need to know the value of $s_e$.