Mth 120 – Statistics – **Practice Exam 2 Solutions**

1. Match the picture a-f with the correlation coefficient I-VI
    a. I
    b. II
    c. VI
    d. IV
    e. V
    f. III

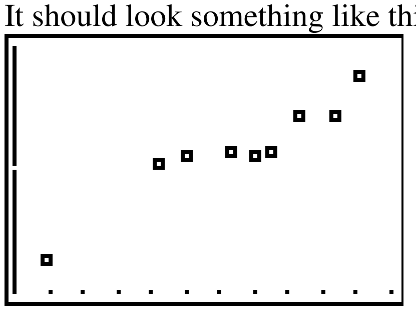
2.

x	y	$\frac{x_i - \bar{x}}{s_x}$	$\frac{y_i - \bar{y}}{s_y}$	$\left(\frac{x_i - \bar{x}}{s_x}\right)\left(\frac{y_i - \bar{y}}{s_y}\right)$
5	49	1	-19/17	-19/17
3	74	0	6/17	0
1	82	-1	14/17	-14/17
				-33/17

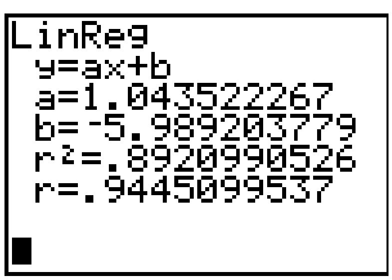
So $r = \frac{-33/17}{2} \approx -0.9706$

3.

a. It should look something like this:



b.



So $\hat{y} = 1.0435x - 5.9892$

c. The predicted score is $\hat{y}$ when $x = 80$, so $\hat{y} = 1.0435 \cdot 80 - 5.9892 \approx 77.5$

4.
    a. No – A linear model is appropriate here.
    b. Yes – This data set does not have constant error variance.
    c. Yes – These residuals are patterned.

5. In this case, the predictor variable is the *hours spent studying*, while the response variable is the *grades on a test*.

6. $S = \{HHH, HHT, HTH, THH, TTH, THT, HTT, TTT\}$

7. $P(E \text{ } or \text{ } F) = P(E) + P(F) - P(E \text{ } and \text{ } F) = 0.68 + 0.51 - 0.22 = 0.97$

8. $P(M) = \dfrac{12}{28}$ and $P(M \mid L) = \dfrac{3}{5}$.
   Since these are not equal, *M* and *L* are not independent

9. *P*(working) = *P*(none of transistors have failed) = $0.99 \cdot 0.98 \cdot 0.97 \approx 0.941$

10. Since order doesn't matter, this is just ${}_{20000}C_{50} = \dfrac{20000!}{50! \cdot 19950!}$.

11. *P*(at least one did not vote) = 1 – *P*(all voted) = $1 - 0.513^5 \approx 0.9645$

12. Since 2 cards have been already dealt to you, there are only 50 left that we don't know. Also, there are only 11 hearts left out of the original 13. With that in mind, there are then ${}_{11}C_3$ ways to pick 3 hearts, and ${}_{50}C_3$ ways to choose any 3, so the probability is $\dfrac{{}_{11}C_3}{{}_{50}C_3} \approx 0.008$.

13. $P(W \mid D) = \dfrac{P(W \text{ } and \text{ } D)}{P(D)} = \dfrac{0.10}{0.29} \approx 0.345$

14. $E(X) = (17)\left(\dfrac{2}{38}\right) + (-1)\left(\dfrac{36}{38}\right) \approx -\$0.05$

15. *P*(27 or more) = $P(X = 27) + P(X = 28) = {}_{28}C_{27}(0.94)^{27}(0.06)^1 + {}_{28}C_{28}(0.94)^{28}(0.06)^0$
    ≈ 0.493