Math 3339
Review for Test 1 KEY

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1. $E[X] = 3.7\ miles,\ V[X] = 2.61$

2. $\tilde{\mu} = 3.65$

3. $median = 172,\ \bar{x} = 169.4,\ s^2 = 52.30$

4. p = 0.6, n = 10 thus Binomial distribution; $P(X \geq 5) = 1 - P(X \leq 4) =$

```
> 1-pbinom(4,10,.6)
[1] 0.8337614
```

5.

#11 The test grades for a certain class were entered into a Minitab worksheet, and then Descriptive Statistics were requested. The results were:

MTB> Describe 'Grades'.

Q2

	N	MEAN	MEDIAN	TRMEAN	STDEV	SEMEAN
Grades	28	74.71	76.00	75.50	12.61	2.38

	MIN	MAX	Q1	Q3
Grades	35.00	94.00	68.00	84.00

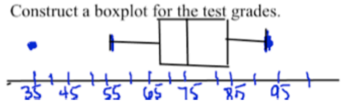
You happened to see, on a scrap of paper, that the lowest grades were 35, 57, 59, 60, … but you don't know what the other individual grades are. Nevertheless, a knowledgeable user of statistics can tell a lot about the data set simply by studying the set of descriptive statistics above.

a. Write a brief description of what the results in the box tell you about the distribution of grades. Be sure to address:

   i. The general shape of the distribution slightly skewed left
   ii. Unusual features, including possible outliers
   iii. The middle 50% of the data IQR = 16 (68,84)
   iv. Any significance in the difference between the mean and the median not really

Q3 - Q1
IQR = 16
1.5IQR = 24
outliers Q1-24, Q3+24
(44, 108)
35 is an outlier

b. Construct a boxplot for the test grades.



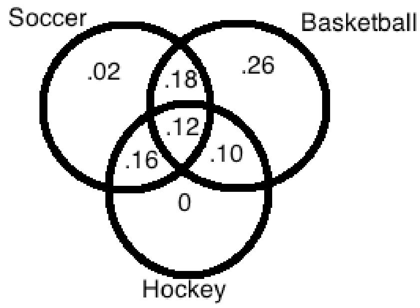
6. 0.33

7.
   a. 0.1
   b. 0.1
   c. yes $P(H \mid L) = P(H)$

8.

a. 0.027
b. 0.778

9.



a.
b. 0.82
c. 0.16

10. 0.5

11.

a. $P(X = 4) = 0.15$
b. $P(1 \le X < 3) = 0.45$
c. 2.25
d. 1.178
e. 3

12.

a. $E[Y] = 57$
b. $V[Y] = 17.64$
c. 4.2
d. 17.64

13.

a. 192
b. 108
c. 0.4375 or 7/16

14.

a. $P\left(A \mid B\right) = \frac{2}{3}$
b. No

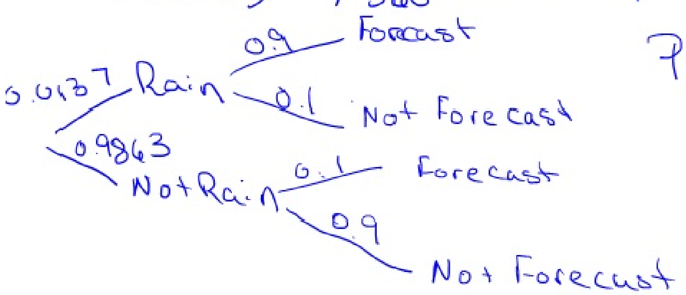
15.

a. 0.044
b. 0.3409

16. 0.9066543

17.

$P(Rain) = 5/365 = 0.0137$



$$P(Rain \mid Forecast) = \frac{0.0137(0.9)}{0.0137(0.9) + 0.9863(0.1)} = \frac{0.01233}{0.11096} = 0.1111$$

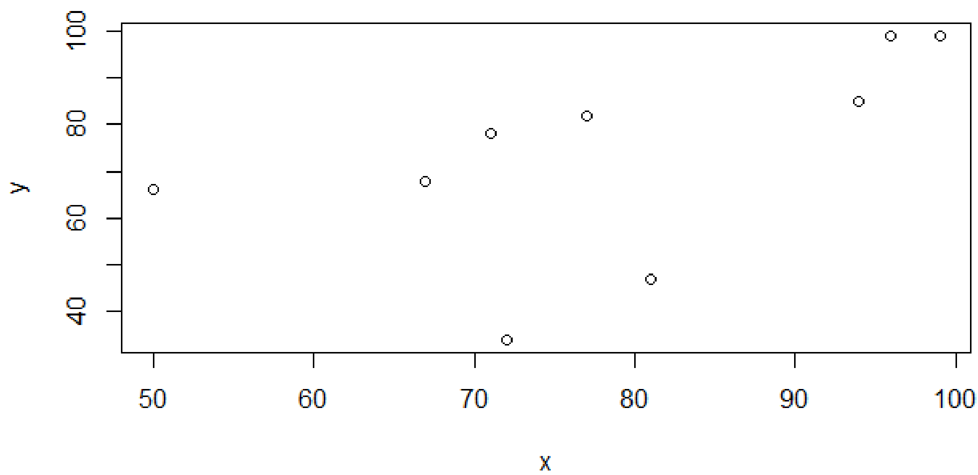
18. The following is what is done in R studio

```
> x=c(77,50,71,72,81,94,96,99,67)
> y=c(82,66,78,34,47,85,99,99,68)
> plot(x,y)
> cor(x,y)
[1] 0.5610055
> grades.lm=lm(y~x)
> summary(grades.lm)
Call:
lm(formula = y ~ x)

Residuals:
    Min      1Q  Median      3Q     Max
-34.017  -0.114  10.001  10.761  15.081

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  12.0623    34.6612   0.348    0.738
x             0.7771     0.4334   1.793    0.116

Residual standard error: 19.47 on 7 degrees of freedom
Multiple R-squared:  0.3147,   Adjusted R-squared:  0.2168
F-statistic: 3.215 on 1 and 7 DF,  p-value: 0.1161
```



a)
b) Strength: Moderate, Direction: positive, Form: linear
c) Correlation = r = 0.561 there is a positive moderate relationship between the grades on the first exam (*x*) and the grades on the final exam (*y*).
d) LSLR: $\hat{y} = 12.0623 + 0.7771x$
e) *X = 85;* predicted final exam score = 78.1158
f) Coefficient of determination: $R^2 = 0.3147$, this means that 31.47% of the variation in the final exam scores can be explained by the LSLR. This low of a R^2 implies that the first exam score may not be the best (or only thing) to predict final exam score.

19. This is binomial with n = 15 and p = 0.05
a) P(X = 5) = 0.00056
b) This is a low probability.
c) E(X) = 15*.05 = 0.75 (which also confirms that having 5 defective may be too many defective).