Elementary Statistics
Chapter 3 Test Review

1. (35 points) Given the following data:

33	51	73	81	83	91	103	117	132	141	152
181	185	189	192	198	205	305	305	710	715	715
715										

Find the following (round to 2 decimal places):

a) Mean = 246.61
b) Median = 181
c) Sample Standard Deviation = 229.75
d) Population Standard Deviation = 224.70
e) Sample Variance = 52787.16
f) Population Variance = 50492.06
g) Mode = 715

2. (15 points) By hand, find the sample standard deviation and sample variance of the following numbers: 1, 8, 23, 40 (round to 2 decimal places)

Step 1: Find $\bar{x}$

$$\bar{x} = \frac{1+8+23+40}{4} = \frac{72}{4} = 18$$

Step 2: Put data values in first column: x	**Step 3:** Find $x - \bar{x}$	**Step 4:** Now square the values from step 3: $(x-\bar{x})^2$
1	1 – 18 = -17	$(-17)^2 = 289$
8	8 – 18 = -10	$(-10)^2 = 100$
23	23 – 18 = 5	$(5)^2 = 25$
40	40 – 18 = 22	$(22)^2 = 484$
	Step 5: Now sum the values from step 4: $\Sigma(x-\bar{x})^2$ ->	$\Sigma(x-\bar{x})^2 = 898$

Step 6: Now plug the value from step 5 into our formula and find our sample standard deviation:

$$s = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}} = \sqrt{\frac{898}{4-1}} = \sqrt{\frac{898}{3}} = 17.30, s^2 = 299.33$$

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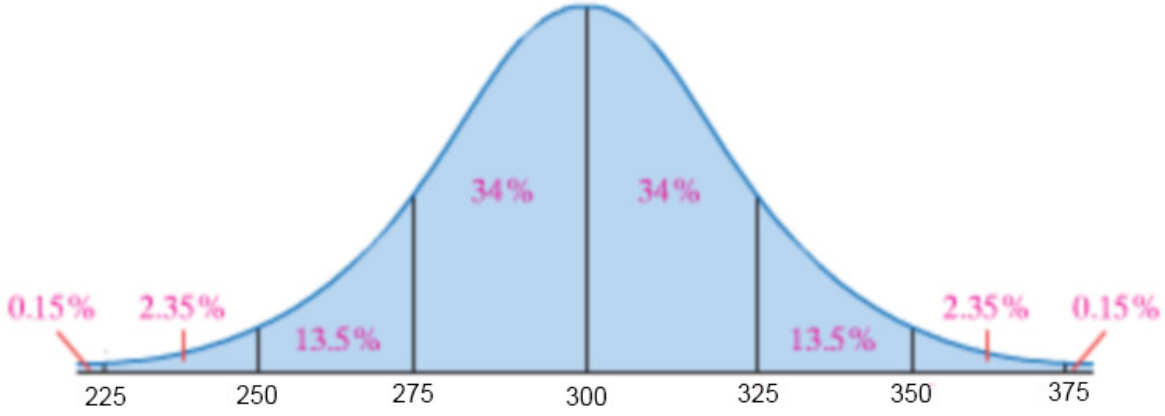
3. (10 points) The weight, in grams, of the pair of kidneys in adult males between the ages of 40 and 49 has a bell-shaped distribution with a mean of 300 grams and a standard deviation of 25 grams.
    a. About 95% of kidney pairs will be between what weights?
    b. What percentage of kidney pairs weighs between 275 and 375?
    c. What percentage of kidney pairs weighs less than 225 and more than 350?
    d. What percentage of kidney pairs weighs between 250 and 325?

Build the table below:



a) 250 – 350
b) 34% + 34% + 13.5% + 2.35% = 83.85%
c) 0.15% + 2.35% + 0.15% = 2.65%
d) 13.5% + 34% + 34% = 81.5%

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4. (10 points) Given the following distribution:

Ages	Freq
10-29	15
30-49	5
50-69	23
70-89	35

Find the sample mean and sample standard deviation (round to 2 decimal places)

We need our midpoints (take the LCL of the first class and add the LCL of the second class, then use class width to get the rest):

Midpoints	Freq
20	15
40	5
60	23
80	35

$\bar{x} = 60, s = 22.79$

5. (5 points) Determine which student scored higher relative to their particular class. Janet got 80 and her class' mean was 73 with a standard deviation of 5. Sally got 82 and her class' mean was 77 with a standard deviation of 7. (Show all work to justify your answer)

Janet	Sally
$z = \frac{x - \mu}{\sigma}$ $z = \frac{80 - 73}{5}$ $z = 1.4$ Janet scored higher because her z-score is higher	$z = \frac{x - \mu}{\sigma}$ $z = \frac{82 - 77}{7}$ $z = 0.71$

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6. (10 points) Given the following data:

33	51	72	81	82	91	93	97	101	210
305	417	505	567	601	902	1014			

a) Find the percentile of 567

$$\frac{13}{17}\cdot 100 = 76th$$

b) Find the percentile of 91

$$\frac{5}{17}\cdot 100 = 29th$$

c) Find P_{30}

$$i = \left(\frac{k}{100}\right)(n+1)$$

$$i = \left(\frac{30}{100}\right)(17+1)$$

$$i = 5.4$$

So we are going to average the 5th and 6th value:

$$\frac{82+91}{2} = 86.5$$

d) Find P_{17}

$$i = \left(\frac{k}{100}\right)(n+1)$$

$$i = \left(\frac{17}{100}\right)(17+1)$$

$$i = 3.06$$

So we are going to average the 3rd and 4th value:

$$\frac{72+81}{2} = 76.5$$

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7. (5 points) Given the following data:

5 11 22 23 27 31 45 85 92 105 210

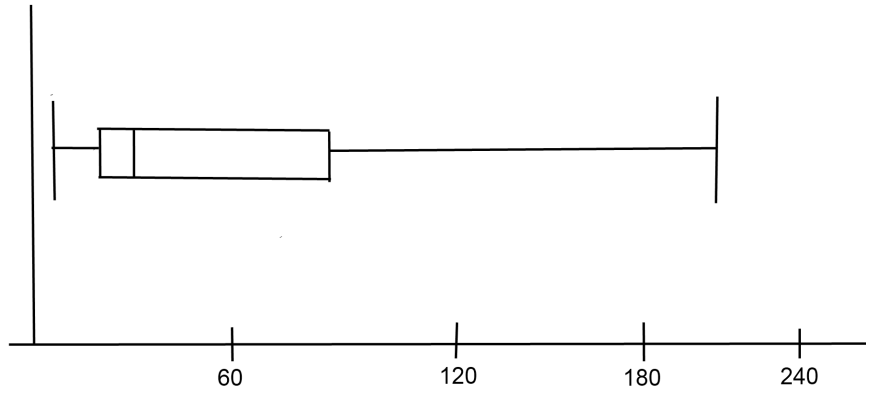
a) Find the 5-number summary

b) Draw the box plot

c) Determine if the data is skewed right, skewed left, or symmetric.

a) 5, 22, 31, 92, 210

b)



c) skewed right

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8. (10 Points) Given the following population data:

3	25	27	31	35	41	53	72	85	91	103
107	110	111	112	230	405	713	815	821	822	1505

a) Compute the z-score corresponding to 35

$$z = \frac{x - \mu}{\sigma} = \frac{35 - 287.1363636}{386.015814} = -0.65$$

b) Determine the quartiles

$$Q_1 = 41, Q_2 = 105, Q_3 = 405$$

c) Compute the interquartile range (IQR)

$$IQR = Q_3 - Q_1 = 405 - 41 = 364$$

d) Determine the lower and upper fences, are there any outliers?

$$LF = Q_1 - 1.5(IQR) = 41 - 1.5(364) = -505$$
$$UF = Q_3 + 1.5(IQR) = 405 + 1.5(364) = 951$$

1505 is an outlier since it is greater than our upper fence (UF)