Please follow the sample & refer back to it to complete the rest of the worksheet.

M414 – Chapter 3
Worksheet 3 - Empirical Rule and Normal Distribution

In a normal distribution, what percent of the values lie:

1. below the mean? 50%
2. above the mean? 50%
3. within one standard deviation of the mean? 68%
4. within two standard deviations of the mean? 95%
5. within three standard deviations of the mean? 99.7%

6. 2000 freshmen at State University took a biology test. The scores were distributed normally with a mean of 70 and a standard deviation of 5. Label the mean and three standard deviations from the mean.

\[ u = 70 \]
\[ \sigma = 5 \]

*remember the percent inside the curve!*

Answer the following questions based on the data:

a) What percentage of scores are between scores 65 and 75? 34%

b) What percentage of scores are between scores 60 and 70? 13.5% + 34% = 47.5%

c) What percentage of scores are between scores 60 and 85? 13.5% + 34% + 34% + 13.5% + 2.35% = 97.35%

d) What percentage of scores is less than a score of 55? 0.15%

e) What percentage of scores is greater than a score of 80? 2.35% + 0.15% = 2.5%

f) Approximately how many biology students scored between 60 and 70? 13.5% + 34% = 47.5% \[ 0.475 \times 2000 = 950 \] students

g) Approximately how many biology students scored between 55 and 60? 2.35% \[ 0.0235 \times 2000 = 47 \] students

Answer the following questions based on the data:

a) What percentage of scores are between scores 20 and 28? 68%

b) What percentage of scores are between scores 16 and 32? 95%

c) What percentage of scores are between scores 16 and 28? 81.5%

d) What percentage of scores is less than a score of 12? 0.15%

e) What percentage of scores is greater than a score of 24? 50%

f) Approximately how many juniors scored between 24 and 28? 34 \[ 0.34 \times 500 = 170 \] students

g) Approximately how many juniors scored between 20 and 28? 13 \[ 0.13 \times 500 = 65 \] students

h) Approximately how many juniors scored between 24 and 32? 47.5 \[ 0.475 \times 500 = 237.5 \] students

i) Approximately how many juniors scored between 16 and 20? 67.5 \[ 0.675 \times 500 = 337.5 \] students

j) Approximately how many juniors scored higher than 32? 0.25 \[ 0.025 \times 500 = 12.5 \] students
8. 500 freshmen at Schaumburg High School took an algebra test. The scores were distributed normally with a mean of 75 and a standard deviation of 7. Label the mean and three standard deviations from the mean.

9. Here are the scores for a recent test in M414 Statistics.

<table>
<thead>
<tr>
<th>Score</th>
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<tbody>
<tr>
<td>90</td>
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<td>100</td>
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</tbody>
</table>

Answer the following questions regarding this set of data.

- Median = 87.5
- Mean = 85
- Mode = 90

- Standard Deviation = 10.77
- Variance = 115.99 (116)

How many scores are within 1 standard deviation of the mean? 18

- (Blw 75 & 85 (inclusive))

How many scores are within 2 standard deviations of the mean? 25

- (Blw 64 & 100 (inclusive))

Hint: Drawing the curve will help answer the last two questions!!!