**Review Summary – Statistics**

You need to know:

* how to calculate standard deviation given different pieces of information using a calculator
* recognize what a normal distribution curve looks like, read a normal distribution graph
* determine the percent of items that fall on the curve
* calculate z-scores and give percent of the graph from the left, right, and in between two values using the z-score table and/or calculator
* calculate confidence intervals
* determine how much two confidence intervals overlap
* use standard deviation and z-scores within a problem ex. warranties
* **Calculator Procedures:**

1) To calculate mean( or ) and standard deviations ():

a) Given raw data in a table or list

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Player** |  |  |  |  |  |  |  |  |  |  | **Mean** | **Standard Deviation** |
| Anna | 36 | 41 | 43 | 39 | 45 | 27 | 40 | 37 | 31 | 28 |  |  |

StatEditput data into L1StatCalc1 Var Statsenterenter

b) Given raw data in a table with a frequency list

StatEditput data into L1, frequency numbers in L2StatCalc1 Var StatsenterL1, L2 enter

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Score** | **105** | **107** | **109** | **111** | **113** | **115** | **Mean** | **Standard Deviation** |
| **Frequency** | 3 | 5 | 12 | 15 | 7 | 2 |  |  |

\*2) Z-scores

 **Looking for the percent (**% by 100 to get the z-score)

 **Calculator:** 2nd  Catalog normCdf. ENTER(lower bound, upper bound, mean, standard deviation)

 \*Lower bound can be zero if not given. Upper bound can be any number more than 4 standard deviations.

 (That is adding the standard deviation to the mean)\*\*

 **Given the percent and are determining the x value**

 **Calculator:** 2nd  Catalog invNorm ENTER (decimal value of percent, mean, standard deviation)

**Practice:**

1) Complete the following:

 The mean is the \_\_\_\_\_\_\_\_\_\_\_\_\_ of a set of data.

 Standard deviation is a measure of how close the data is to the \_\_\_\_\_\_\_\_\_. If the data is close, the

 standard deviation is \_\_\_\_\_\_\_ and if the data is scattered farther away from the mean, the standard

 deviation is \_\_\_\_\_\_\_\_\_.

2) Calculate the mean and standard deviation for each set of data. Round to the nearest tenth.

 a) 127, 156, 132, 121, 119, 125, 128, 129, 129, 123 b) 71, 63, 59, 65, 67, 65, 66, 61, 60, 70

 c) For L1, choose the score in the middle of each pair given. Ex 65-67 type in 66.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Score** | **65-67** | **69-71** | **73-75** | **77-79** | **81-83** | **85-87** | **Mean** | **Standard Deviation** |
| **Frequency** | 3 | 5 | 12 | 15 | 7 | 2 |  |  |

3) An environmental scientist studying giant cockroaches caught and measured the length ten of them:

 3.4cm, 4.2 cm, 3.7 cm, 3.9 cm, 4.0 cm, 4.5 cm, 3.6 cm, 3.8 cm, 4.1 cm, 4.4 cm. Calculate the standard

 deviation of her data to the nearest **hundredth.**

4) A producer of bolts for oil rigs tries to ensure each bolt has a mass 3g. They checked 5 of the bolts to

 ensure they met this standard. Calculate the standard deviation for the 5 bolts to the **hundredth**.

 2.1g, 3.4g, 3.3g, 2.8g, 3.2g

5a) Why does this graph represent normal distribution?

 b) Why does this graph NOT represent a normal distribution curve?

6) Calculate the following z-scores. Change each score to a percent and sketch the graph to show what part

 of the graph is represented.

 a) Area to the **left** of these z-scores b) Area to the **right** of these z-scores

 z = -1.23 z = -0.79

 z = 2.01 z = 2.22

 c) Area **between** these z-scores

 z = -1.89 and z = 0.44 z = -2.32 and z = -0.57

 z = 0.84 and z = 2.45

7) Given these percentages, determine the z-scores using the z-score table.

 a) 20.33% b) 64.43% c) 97.36% d) 0.72%

8) The mean mass of chickens on a poultry farm is 2.75 lbs. The standard deviation is 0.5 lbs. What

 percent of the chickens on the farm will have a mass that is **less than** 2 lbs.?

9) Determine the percent of volleyball players that have a height **less than** 2.1 m if the mean of their

 heights is 2.3 m and the standard deviation is 0.4.

10) The average score on a Social test was 63% with a standard deviation of 5.3%. What percent of the

 students scored **higher than**  72%?

11) The mean lifespan of a standard light bulb is 1000 hours with a standard deviation of 230.2 hours.

 What percent of bulb s can be expected to last **longer than** 1500 hours?

12) Determine the percent of basketball players, **between** the heights of 2.3m and 2.8 that have a mean

 height of 2.5 m and a standard deviation of 0.3.

13) A company produces hinges for doors. The acceptable length of a hinge is between 5.2 cm and 5.5 cm.

 All other hinges are rejected. The average length produced is 5.3 cm with a standard deviation of

 0.3 cm. What percent of hinges produced fall within the acceptable levels?

14) Use the z-score formula: . A group of monkeys had tails that had tail lengths, normally

 distributed, with a mean of 40 cm. Half of the monkeys had tail lengths between 31 cm and 45 cm.

 Determine the **standard deviation** to two decimal places.

 a) Label the diagram.

 b) What percent is to the left of the 31 cm mark? \_\_\_\_\_

 c) Look up the z-score for the percent in part b) \_\_\_\_\_\_\_

 d) Substitute the z-score into the formula and solve for . \_\_\_\_\_\_

15) Sandra says 66% of her class scored lower than her on a test. The class average was 65% with a

 standard deviation of 4%. What was her score?

16) While planting trees for a summer job, Jack was in the **top** 15% of planters. The average number of

 trees planted in a day was 129 with a standard deviation of 16. How many trees did Jack plant?

17) A windshield wiper manufacturer determined that the mean life of a pair of wipers is 25 months with a

 standard deviation of 9.8 months. What length of warranty should they offer if they want to restrict

 replacements to less than (at most) 2.1%?

18) A recent survey found that 71% of people smile at people they see as they walk down the street. The

 results of this survey were considered accurate within  2.5%, 19 times out of 20. 1200 people were

 surveyed.

* Determine the confidence interval with percentages
* Determine the confidence interval in terms of number of people
* Determine the range of people represented by the confidence interval.
* Determine the confidence level.

19) Results of a survey show that 77.3% to 82.9% of drivers listen to the radio while driving.

* Determine the margin of error for this survey.
* Write the results as a confidence interval.

20) The quality control engineer refers to the following chart when testing random sample groups of

 soccer balls produced at a factory.

|  |  |
| --- | --- |
| **Confidence Interval** | **Sample Size** |
| 99% | 300 |
| 95% | 225 |
| 90% | 195 |

 What is the relationship between the confidence level and the sample size?

21) A survey found that 35% of students see the dentist twice a year and 45% of students see the dentist

 every nine months. The margin of error for this survey was 5.5%.

 a) Determine the confidence interval for the 35% group.

 b) Determine the confidence interval for the 45% group.

 c) Do the intervals overlap? If yes, then by how much?

**Key:**

**1)** average, mean, low, high **2a) ** = 128.9, **** = 9.79 **b)** **** = 64.7, **** = 3.82 **c)** **** = 76.18, **** = 4.86 **3)** 0.33 **4)** 0.48 **5a)** bell shaped, symmetrical, sloping to zero on both ends, peaking in middle **b)** not bell shaped, not symmetrical

**6a)**







**7a)**  z = -0.83 **b)**  z = 0.37 **c)** z = 1.94 **d)** z = -2.44 or -2.45 **8)** 6.68% or 7%  **9)** 31% (use normalcdf) **10)** 4.46% 0r 4.5% **11)** 1.5% **12)** 59%(use normalcdf) **13)** 37.79% or 38% **14b)** 25% **c)** -0.674489 **d)** 13.3 cm **15)**  67% **16)** 146 trees **17)** 5 months (use invnorm) **18)** 71% ± 2.5%, 852 30 people, 822 to 882 people, 19/20 = 95% confidence **19)** ± 2.8%, 80.1% ± 2.8% **20)** As more soccer balls are tested, the confidence level increases **21a)** 29.5% to 40.5% **b)** 39.5% to50.5% **c)** yes they overlap by 40.5 – 39.5 = 1%