Deliverable 02 – Worksheet

**Instructions:** The following worksheet is shown to you by a student who is asking for help. Your job is to help the student walk through the problems by showing the student how to solve each problem in detail. You are expected to explain all of the steps in your own words.

**Key:**

* **<i>** - This problem is an incorrect. Your job is to find the errors, correct the errors, and explain w hat they did wrong.
* **<p>** - This problem is partially finished. You must complete the problem by showing all steps while explaining yourself.
* **<b>** - This problem is blank. You must start from scratch and explain how you will approach the problem, how you solve it, and explain why you took each step.

1. **<p>** Assume that a randomly selected subject is given a bone density test. Those tests follow a standard normal distribution. Find the probability that the bone density score for this subject is between -1.53 and 1.98

**Student’s answer:** We first need to find the probability for each of these z-scores using Excel.

For -1.53 the probability from the left is 0.0630, and for 1.98 the probability from the left is 0.9761.

**Continue the solution:**

*Second and lastly, subtract the probability of smaller z-score (-1.53) from the probability of larger z-score (1.98) because the probability between two values is the difference of the probability to the left of the values.*

*P(Z< 1.98) – P(Z <- 1.53) = 0.9761-0.0630 = 0.9131*

1. **<b>** The U.S. Airforce requires that pilots have a height between 64 in. and 77 in. If women’s heights are normally distributed with a mean of 65 in. and a standard deviation of 3.5 in, find the percentage of women that meet the height requirement.

**Answer and Explanation:**

*Enter your step-by-step answer and explanations here.*

*Step 1: Calculate the z-score for 64 and 77 using the z-score formula*

*Z(64) = (/ = (64 – 65)/3.5 = -0.29*

*Z(77) = = (/ = (77-65)/ 3.5 = 3.43*

*Step 2: Calculate the probability of each z-score using Excel’s NORM.S.DIST function*

*=NORM.S.DIST (-0.29, TRUE) = 0.3875*

*=NORM.S.DIST (3.43, TRUE) =0.9997*

*Step 3: Subtract the probability of smaller z-score (-0.29) from the probability of larger z-score (3.43) because the probability between two values is the difference of the probability to the left of the values.*

*P(Z< 3.43) – P(Z <- 0.29) = 0.9997 – 0.3875 = 0.6122 = 61.22%*

*Step 4: Interpret the results*

*61.22% of women meet the height requirement.*

1. **<i>** Women’s pulse rates are normally distributed with a mean of 69.4 beats per minute and a standard deviation of 11.3 beats per minute. What is the z-score for a woman having a pulse rate of 66 beats per minute?

**Student’s answer:**

Let

**Corrections:**

*Z-score is obtained by plugging the values of, and into the z-score formula and solving for z.*

*Given that = 66, = 69.4, and = 11.3, z-score is calculated as follows:*

*The student’s answer is incorrect because the student subtracted the x-value from the population mean ( and divided the result by the standard deviation () instead of subtracting the from the x-value and dividing the result by the.*

1. **<b>** What is the cumulative area from the left under the curve for a z-score of -0.875? What is the area on the right of that z-score?

**Answer and Explanation:**

*=NORM.S.DIST(z-score) gives the area to the left of a z-score.*

*Plug in “=NORM.S.DIST(-0.875, TRUE)” into Excel to get 0.1908, which is the cumulative area to the left of z = -0.875*

*=1-NORM.S.DIST(z-score) gives the area to the right of a z-score*

*Plug in “=1-NORM.S.DIST (-0.875, TRUE)” into Excel to get 0.8092, which is the cumulative area to the right of z = -0.875.*

1. **<i>** If the area under the standard normal distribution curve is 0.6573 from the right, what is the corresponding z-score?

**Student’s answer**: We plug in “=NORM.INV(0.6573, 0, 1)” into Excel and get a z-score of 0.41.

**Corrections:**

*In Excel, z-score is obtained using NORM. INV function.*

*The result after plugging in “=NORM.INV (1- 0.6573, 0, 1”) into Excel is -0.41*

*The student’s answer is wrong because the student failed to take the complement of 0.6573.The student should have subtracted 0.6573 from 1 because the area under the curve is on the right of the z-score.*

1. **<p>** Manhole covers must be a minimum of 22 in. in diameter, but can be as much as 60 in. Men have shoulder widths that are normally distributed with a mean of 18.2 and a standard deviation of 2.09 in. Assume that a manhole cover is constructed with a diameter of 22.5 in. What percentage of men will fit into a manhole with this diameter?

**Student’s answer:** We need to find the probability that men will fit into the manhole. The first step is to find the probability that the men’s shoulder is less than 22.5 inches.

**Continue the solution:**

*Enter your step-by-step answer and explanation*

*Step 2: Calculate the z-score of 22.5 using z-score formula*

*Z(22.5) = (/ = (22.5 – 18.2)/2.09 = 2.06*

*Step 2: Calculate the probability of the z-score using Excel’s NORM.S.DIST function*

*= NORM.S.DIST (2.06, TRUE) = 0.9802 = 98.02%*

*Step 3: Interpret the results*

*98.02% of men will fit into a manhole with a diameter of 22.5 inches.*