Sean Parrell Project 2.3

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**Problem 5.55**Given: Probability of passing the test = 0.7Find:(a) Probability that the student passes on the third try.(b) Probability that the student passes before the fourth try.Solution:(a) Probability of passing on the third try:This is a geometric distribution problem, where the probability of success on the nth trial is given by:

For the third try:

So, the probability of passing on the third try is 0.063.(b) Probability of passing before the fourth try:This means passing on either the 1st, 2nd, or 3rd try. The cumulative probability for this is:

So, the probability of passing before the fourth try is 0.973.

**Problem 6.11**Given:Mean = 200 mlStandard deviation = 15 mlFind:(a) Fraction of cups containing more than 224 ml.(b) Probability that a cup contains between 191 and 209 ml.(c) Number of cups overflowing if 230 ml cups are used for 1000 drinks.(d) Value below which the smallest 25% of the drinks fall.Solution:(a) Fraction of cups containing more than 224 ml:We need to find P(X>224). Standardize the value using the Z-score:

Using the Z-table, P(Z>1.6)=0.0548.Thus, the fraction of cups containing more than 224 ml is 0.0548.(b) Probability that a cup contains between 191 and 209 ml:We need to find P(191<X<209).

For X=191:

For X=209:

Using Z-table:

From the Z-table:

Thus, the probability is 0.4514.(c) Number of cups that will overflow (230 ml cups):We need to find P(X>230) for 1000 drinks.

Using the Z-table, P(Z>2)=0.0228.Thus, out of 1000 cups, the expected number of overflows is:

So, rounded up to 23 cups will overflow.(d) Value below which the smallest 25% of the drinks fall:For the smallest 25%, we look for P(Z<z)=0.25.From the Z-table, Z=−0.674.Now, convert this Z-score back to the original scale:

Thus, the value is 189.89 ml.

**Problem 8.25**Given:Mean = 7 yearsStandard deviation = 1 yearSample size = 9 machinesFind:(a) Probability that the mean life falls between 6.4 and 7.2 years.(b) Value of 𝑥 such that 15% of the means are to the right of x.Solution:For a sample of size 9, the standard deviation of the sample mean is:

1. Probability that the mean life is between 6.4 and 7.2 years:Find the Z-scores for 6.4 and 7.2.For X=6.4:

For X=7.2:

From the Z-table: P(−1.8<Z<0.6)=P(Z<0.6)−P(Z<−1.8)Using the Z-table: P(Z<0.6)=0.7257 and P(Z<−1.8)=0.0359. P(6.4<X<7.2)=0.7257−0.0359=0.6898Thus, the probability is 0.6898.(b) Value of x such that 15% of the means are to the right:We are looking for P(Z>z)=0.15.From the Z-table, Z=1.04.Now, convert this back to the original scale:Thus, the value is 7.35 years.

**Problem 8.54:**Here is a picture I made of what this plot looks like:

