Stat 101
Summer 2023 Session 1
Dr. Lily Yen

Activity 5-1

Show all your work

Name: _____
Number: _____
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Score: ___/12

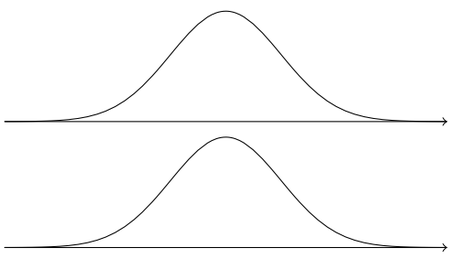
State all Excel functions used.

Problem 1: In Vancouver's BMO Marathon in May, friends, Matt and Sarah both completed the 10-km fast walk. Matt joined Men's ages 30 to 34 group while Sarah, in Women's ages 25 to 29 group. Matt finished his walk in $1:22:28 = 4948$ seconds while Sarah, in $1:31:53 = 5513$ seconds. According to the finishing statistics of their respective group, answer the following questions.

- Mean finishing time of Men's ages 30 to 34 group is 4313 seconds, with $\sigma = 583$ seconds.
- Mean finishing time of Women's ages 25 to 29 group is 5261 seconds with $\sigma = 807$ seconds.
- The distributions of finishing times for both groups are approximately Normal.

Remember that faster (less) time means better performance in racing.

a. Draw these two normal distributions marking the corresponding mean and standard deviation.



b. Find the Z-scores for both and mark on the corresponding normal curves.

c. What percentile did Matt place in his group?

d. What percentile did Sarah place in her group?

Score: /6

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Problem 2: The National Vaccine Information Centre estimates that 90% of Canadians have had chickenpox by the time they reach adulthood.

a. Suppose we take a random sample of 100 Canadian adults. Is the use of binomial distribution appropriate for calculating the probability that exactly 97 out of 100 randomly sampled Canadian adults had chickenpox during childhood?

b. Find the probability that at most 15 out of 100 randomly sampled Canadian adults *have not* had chickenpox.

c. Find the probability that at least half of 10 randomly sampled Canadian adults had chickenpox during childhood.

Score: /3

Problem 3: Sickle cell anemia is a genetic blood disorder where red blood cells lose their flexibility and assume an abnormal, rigid, "sickle" shape, which results in a risk of various complications. If both parents are carriers of the disease, then a child has

- a 1/4 chance of having the disease,
- a 1/2 chance of being a carrier, and
- a 1/4 chance of neither having the disease nor being a carrier.

If both parents who are carriers of the disease have 3 children, find each of the following probabilities.

a. The probability that none of the 3 children will have the disease.

b. The probability that at least one will neither have the disease nor be a carrier.

c. The probability that exactly 2 are carriers.

Score: /3

/6