6.2 HW #8 AP Statistics Name:

1. The manager of a children's puppet theatre has determined that the number of adult tickets he sells for a Saturday afternoon show is a random variable with a mean of 28.3 tickets and a standard deviation of 5.3 tickets. The mean number of children's tickets he sells is 42.5, with a standard deviation of 8.1.

(a) The adult tickets sell for \$10. Let A = the money he collects from adult tickets on a random Saturday. What are the mean and standard deviation of A?

(b) The children's tickets sell for \$6. Let T = the money he collects from all ticket sales (adults and children) on a random Saturday. Assume (unrealistically, perhaps) that the number of tickets sold to adults is independent of the number sold to children. What are the mean and standard deviation of T?

(c) It costs \$300 for the manager to put on each puppet show. Let P = the profit from a random Saturday's show. What are the mean and standard deviation of P?

2. Mr. Voss and Mr. Cull bowl every Tuesday night. Over the past few years, Mr. Voss's scores have been approximately Normally distributed with a mean of 212 and a standard deviation of 31. During the same period, Mr. Cull's scores have also been approximately Normally distributed with a mean of 230 and a standard deviation of 40. Assuming their scores are independent, what is the probability that Mr. Voss scores higher than Mr. Cull on a randomly-selected Tuesday night?

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3. Lamar and Lawrence run a two-person lawn-care service. They have been caring for Mr. Johnson's very large lawn for several years, and they have found that the time it takes Lamar to mow the lawn itself is approximately Normally distributed with a mean of 105 minutes and a standard deviation of 10 minutes. Meanwhile, the time it takes for Lawrence to use the edger and string trimmer to attend to details is also Normally distributed with a mean of 98 minutes and a standard deviation of 15 minutes. They prefer to finish their jobs within 5 minutes of each other. What is the probability that this happens, assuming their finish times are independent?

Quiz 6.2A

1. (a) $\mu_A = 10(28.3) = \$283$; $\sigma_A = 10(5.3) = \$53$. (b) $\mu_T = 10(28.3) + 6(42.5) = \$538$; $\sigma_T = \sqrt{(10 \cdot 5.3)^2 + (6 \cdot 8.1)^2} = \$71.91$. (c) $\mu_P = \$538 - \$300 = \$238$; $\sigma_T = \$71.91$ (not changed by subtracting a constant). **2.** Let D = difference in scores between Mr. Cull and Mr. Voss. Then $\mu_D = 18$ and $\sigma_D = \sqrt{31^2 + 40^2} = 50.61$. $P(D < 0) = P\left(z < \dfrac{0 - 18}{50.6}\right) = P(z < -0.36) = 0.3594$.

Quiz 6.2B

1. (a) $\mu_D = 10(68) = \$680$; $\sigma_D = 10(9.5) = \$95$. (b) $\mu_T = 10(68) + 20(58) = \$1840$; $\sigma_T = \sqrt{(10 \cdot 9.5)^2 + (20 \cdot 7.8)^2} = \$182.65$. (c) $\mu_G = \$1840 - \$500 = \$1340$; $\sigma_G = \$182.65$ (not changed by subtracting a constant). **2.** Let D = difference in height between random male and random female. Then $\mu_D = 5$ and $\sigma_D = \sqrt{3^2 + 2.5^2} = 3.91$. $P(D < 0) = P\left(z < \dfrac{0 - 5}{3.91}\right) = P(z < -1.28) = 0.1003$.

Quiz 6.2C

1. (a) $\mu_H = 0.5$; $\sigma_H = \sqrt{0.5(0 - 0.5)^2 + 0.5(1 - 0.5)^2} = 0.5$ (b) $\mu_H = 0.5 + 0.5 + 0.5 + 0.5 = 2$; $\sigma_H = \sqrt{0.5^2 + 0.5^2 + 0.5^2 + 0.5^2} = 1$. **2.** (a) $\mu_Y = \dfrac{1}{2}(100) + \dfrac{1}{2}(100) = 100$; .

$\sigma_Y = \sqrt{\left(\dfrac{1}{2}(1.2)\right)^2 + \left(\dfrac{1}{2}(0.65)\right)^2} = 0.682$ (b) $\mu_Y = \dfrac{1}{3}(100) + \dfrac{2}{3}(100) = 100$;

$\sigma_Y = \sqrt{\left(\dfrac{1}{3}(1.2)\right)^2 + \left(\dfrac{2}{3}(0.65)\right)^2} = 0.590$. **3.** We are interested in the difference between their job completion times, so $\mu_D = 105 - 98 = 7$ minutes ; $\sigma_D = \sqrt{10^2 + 15^2} = 18.03$. To be within 5 minutes means ±5 minutes. Therefore

$$P(-5 < D < 5) = P\left(\frac{-5 - 7}{18.03} < z < \frac{5 - 7}{18.03}\right) = P(-0.67 < z < -0.11) = 0.2048.$$