Name: _____ Hour: _____ Date: _____

# Lesson 6.2 Day 1– Transforming Probability Distributions

| Important ideas: | |
|---|---|
| • Adding the same constant, c, to each value ...<br>Shape: stays the same<br>Center: add c<br>Variability: stays the same | Multiplying the same constant, c, to each value ...<br>Shape: stays the same<br>Center: multiply by c<br>Variability: multiply by c<br>$SD = \sigma \rightarrow c\sigma$<br>$Variance = (c\sigma)^2 = c^2\sigma^2$ |

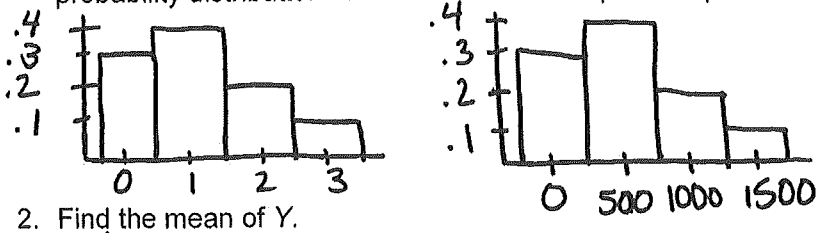
## Check Your Understanding (Homework #2) Part 1

A large auto dealership keeps track of sales made during each hour of the day. Let $X$ = the number of cars sold during the first hour of business on a randomly selected Friday. Based on previous records, the probability distribution of X is as follows:

| **Cars sold** | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| **Probability** | 0.3 | 0.4 | 0.2 | 0.1 |

The random variable $X$ has mean $\mu_x = 1.1$ and standard deviation $\sigma_x = 0.943$. Suppose the dealership's manager receives a $500 bonus from the company for each car sold. Let $Y$ = the bonus received from car sales during the first hour on a randomly selected Friday.

1. Sketch a graph of the probability distribution of $X$ and a separate graph of the probability distribution of $Y$. How do their shapes compare?




2. Find the mean of $Y$.

$\$550 = 1.1 \times 500$

3. Calculate and interpret the standard deviation of $Y$.

$\$471.70$, The bonuses typically vary by $471.70 from the mean of $550.

4. The manager spends $75 to provide coffee and doughnuts to prospective customers each morning. So the manager's net profit $T$ during the first hour on a randomly selected Friday is $75 less than the bonus earned. Describe the shape, center, and variability of the probability distribution of $T$.

Shape will remain the same (skewed right).
mean will be subtracted by 75. $\mu = 550 - 75 = \$475$
SD does not change. $\sigma = 471.70$

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# Lesson 6.2 Day 2– Combining Probability Distributions

LT#1

Important ideas:

Adding and subtracting Random Variables X & Y:

$\mu_{X+Y} = \mu_X + \mu_Y$ | $\mu_{X-Y} = \mu_X - \mu_Y$

$\sigma_{X+Y} = \sqrt{\sigma_X^2 + \sigma_Y^2}$ | $\sigma_{X-Y} = \sqrt{\sigma_X^2 + \sigma_Y^2}$

LT#2: Normal Prob. Dist.

Find new mean and standard deviation!

## Check Your Understanding (Homework #2) Part 2

A large auto dealership keeps track of sales and lease agreements made during each hour of the day. Let $X$ = the number of cars sold and $Y$ = the number of cars leased during the first hour of business on a randomly selected Friday. Based on previous records, the probability distributions of $X$ and $Y$ are as follows:

| Cars sold $x_i$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Probability $p_i$ | 0.3 | 0.4 | 0.2 | 0.1 |

Mean: $\mu_X = 1.1$ Standard deviation: $\sigma_X = 0.943$ $\times 500 = 471.50$

| Cars leased $y_i$ | 0 | 1 | 2 |
|---|---|---|---|
| Probability $p_i$ | 0.4 | 0.5 | 0.1 |

Mean: $\mu_Y = 0.7$ Standard deviation: $\sigma_Y = 0.64$ $\times 300 = 192$

Define $T = X + Y$. Assume that $X$ and $Y$ are independent.

1. Find and interpret $\mu_T$.

$\mu_T = 1.8$ over many many fridays, the dealer expects to sell & lease, on average, about 1.8 cars.

2. Calculate and interpret $\sigma_T$.

$\sigma_T = \sqrt{.943^2 + .64^2} = \sqrt{1.2988} = 1.14$

3. The dealership's manager receives a \$500 bonus for each car sold and a \$300 bonus for each car leased. Find the mean and standard deviation of the manager's total bonus $B$.

$\mu_B = 500(1.1) + 300(.7)$

$= 550 +$

$= 760$

$\sigma_B = \sqrt{(500 \times .943)^2 + (300 \times .64)^2}$

$= \sqrt{259176.25}$

$= \$509.09$