Solutions to Class Exercise #3: Measures of Central Tendency

1. **www.glitterbombyourenemies.com.au**

There's a dedicated website in Australia that sends glitter filled envelops to the MP of your choice starting at $8.99. In 2015, Liberal MP Craig Laundy received one and called emergency services fearing that the envelop contained toxic substances. Six fire engine, six police cars, and one hazmat unit was sent to his office to deal with the glitter[1].

The price for 11 bottles of glitter from a craft store, rounded to the nearest dollar, is shown below:

$$4 \quad 4 \quad 4 \quad 5 \quad 6 \quad 8 \quad 9 \quad 10 \quad 11 \quad 11 \quad 11 \quad 11$$

(a) Calculate the mean, median, and mode.

Mean: $\overline{x} = \frac{\sum x}{n} = \frac{4+4+4+5+6+8+9+10+11+11+11+11}{11} = \frac{94}{12} = \$7.83$

Median: $\frac{8+9}{2} = \$8.50$

Mode: $11.00

(b) Which is the most appropriate measure of central tendency?

Mode is probably the best measure of central tendency for this sample, since it is the most frequently occurring value in the dataset.

(c) Multiply each value by 10 and recalculate the mean. What does multiplying the same value to each data point do to the mean? Explain.

$$40 \quad 40 \quad 40 \quad 50 \quad 60 \quad 80 \quad 90 \quad 100 \quad 110 \quad 110 \quad 110 \quad 110$$

Mean: $\overline{x} = \frac{\sum x}{n} = \frac{40+40+40+50+60+80+90+100+110+110+110+110}{11} = \frac{940}{12} = \$78.33$

Multiplying each value in the dataset by 10 causes the average to change by a factor of 10.

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[1]https://www.theguardian.com/australia-news/2015/aug/18/glitter-in-getups-letter-to-liberal-mp-mistaken-for-suspicious-powder

2. **Winter is Here**

Last August, costume designers for the popular tv show, The Game of Thrones, revealed that the capes worn by Jon Snow were in fact made from IKEA rugs[2]. The faux fur shag carpet retails for $79, comes in three colors, and is advertised to be soil-repellent and hard-working. For those interested in making their own Westeros fashion accessory, IKEA has diy instructions on how to hack Jon Snow's cape.

(a) The time it takes for several GoT fans to make their own cape from the IKEA instructions are shown below. Calculate the average time that it takes for these people to make a cape out of a shag carpet.

Time (min.)	Number of People f	Midpoint m	fm
$0 \leq x < 5$	24	2.5	$24 \times 2.5 = 60$
$5 \leq x < 10$	15	7.5	$15 \times 7.5 = 112.5$
$10 \leq x < 15$	32	12.5	400
$15 \leq x < 20$	18	17.5	315
$20 \leq x < 25$	7	22.5	157.5
$25 \leq x < 30$	8	27.5	220
Sum	**104**		**1265**

Average time it takes to make a cape:

$$\overline{x} = \frac{\sum fm}{\sum f} = \frac{1265}{104} = 12.1635 \, \text{minutes}$$

(b) The same group of people were also asked how many IKEA carpets they had to use before successfully making a cape that they were happy with. The results are below. Calculate the average number of carpets used in the fashion diy.

Number of IKEA Carpets x	Number of People f	fx
1	23	$23 \times 1 = 23$
2	53	$53 \times 2 = 106$
3	10	30
4	10	40
5	8	40
	104	**239**

Average number of carpets used in the fashion hack:

$$\overline{x} = \frac{\sum fx}{n} = \frac{239}{104} = 2.2981 \, \text{carpets}$$

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[2]http://time.com/4901655/ikea-game-of-thrones-rug-cape-diy/