HW9.23

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library(tidyverse)
```

The Z- score formula is

$$Z = \frac{x - \mu}{\sigma}$$

Problem 1

A certain kids' fun run has two age categories: 8-11 and 12-14. Finishing times in the younger group have mean 33 minutes and standard deviation 4 minutes, while finishing times in the older group have mean 29 minutes and standard deviation 5 minutes. - (a) Find and interpret the z-score of an 8-11 year old who finishes in 24 minutes. - (b) Find and interpret the z-score of a 12-14 year old who finishes in 24 minutes. - (c) Which is the more unusual of these two?

finishing times 8 - 11

$$\mu = 33$$

$$\sigma = 4$$

finishing times 12 - 14

$$\mu = 29$$

$$\sigma = 5$$

a.)

```
(24 - 35)/4
```

```
[1] -2.75
```

b.)

```
(24 - 29)/5
```

```
[1] -1
```

c.)

Z-Score of 8 - 11 year olds = -2.75 Z-Score of 12 - 14 year olds = -1.00

The Z-Score of -2.75 is more unusual

Problem 2

```
glimpse(faithful)
```

```
Rows: 272
Columns: 2
$ eruptions <dbl> 3.600, 1.800, 3.333, 2.283, 4.533, 2.883, 4.700, 3.600, 1.95~
$ waiting   <dbl> 79, 54, 74, 62, 85, 55, 88, 85, 51, 85, 54, 84, 78, 47, 83, ~
```

```
mean(faithful$eruptions)
```

```
[1] 3.487783
```

```
sd(faithful$eruptions)
```

```
[1] 1.141371
```

```
(5 - 3.487783)/1.141371
```

```
[1] 1.324913
```

The Z-Score of 5 minute eruption is 1.324913 mins above the mean

Problem 3

A music streaming app determines that users' daily usage is approximately bell shaped with mean 55 minutes and standard deviation 14 minutes. Fill in the blanks:

- Approximately 68% of users listen between 41 and 69 mins
- Approximately 95% of users listen between 27 and 83 mins
- Approximately 99.7% of users listen between 13 and 97 mins

Problem 4

Cholesterol levels for women aged 20-34 are normally distributed (bell-shaped) with mean 185 mg/dl. Approximately 95% of women in this age group have cholesterol between 127 and 243. What is the standard deviation of this distribution?

So the Z-Score of such observation is 2

- 185 - 2x = 127
- 185 + 2x = 243

```
(185 - 127)/2
```

```
[1] 29
```

```
(243-185)/2
```

```
[1] 29
```

The Standard Deviation is 29