Coffee Shop Simulation

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Scenario

- Johanna comes to a coffee shop and wants to buy a cup of coffee
- There are some people waiting in a line, so Johanna wants to estimate how long she needs to wait to get a coffee.

Random Variables

Number of Random Variables: 6

1 - besides Johanna, the number of people in the line
2 - the size of a cup of coffee: tall, grande, venti

Discrete

3 - the time each person needs to order a cup of coffee
4 - the time a barista needs to make a tall cup of coffee
5 - the time a barista needs to make a grande cup of coffee
6 - the time a barista needs to make a venti cup of coffee

Continuous

Discrete Random Variables

besides Johanna, the number of people in the line

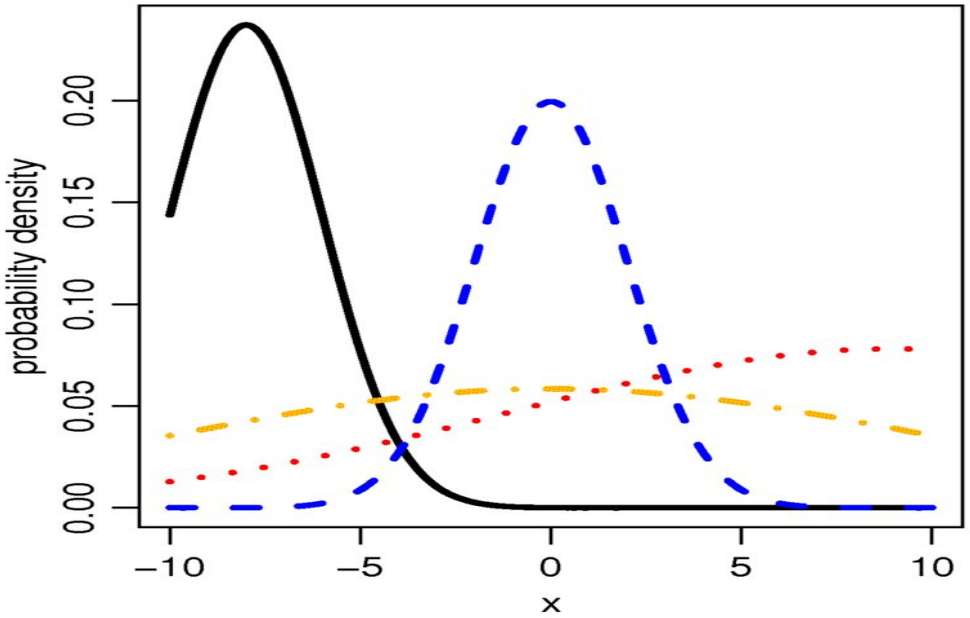
Number	0	1	2	3	4	5	6	7	8
Pr	0.04	0.08	0.12	0.16	0.2	0.16	0.12	0.08	0.04

the size of a cup of coffee

Size	Tall	Grande	Venti
Pr	0.25	0.5	0.25

Continuous Random Variables

To avoid the possibility of negative values and extremely large values, we use truncated normal distribution with upper and lower bounds instead of normal distribution.



Continuous Random Variables

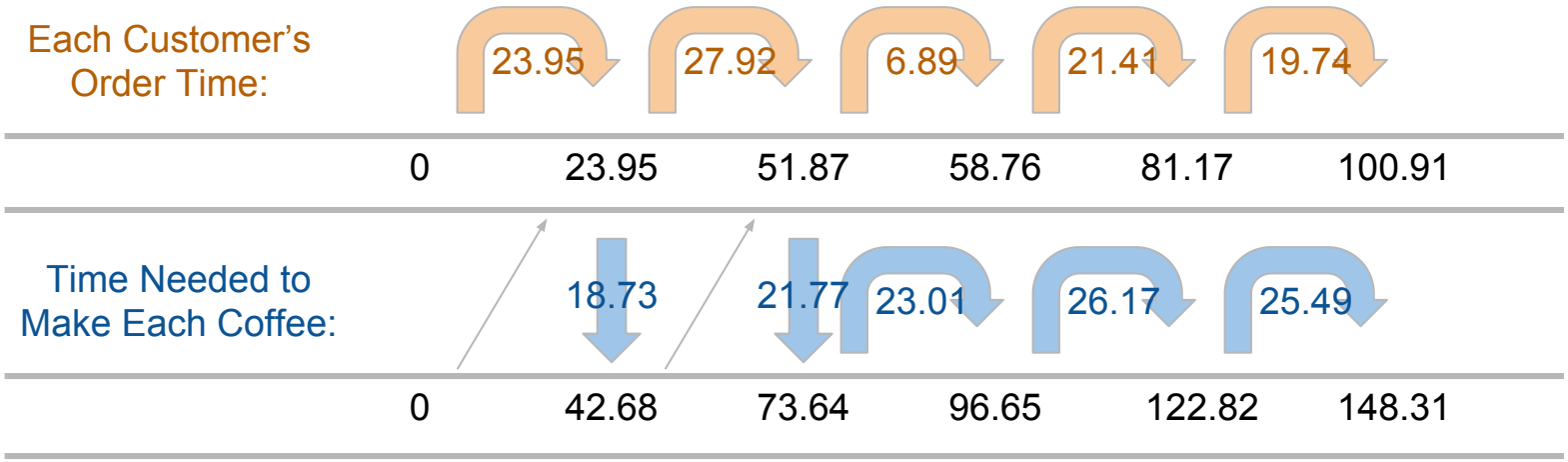
1. time of ordering a cup of coffee: Truncated Normal (mean=25, s.d=5, lower=5, upper=60)
2. time of making a tall cup of coffee: Truncated Normal (mean=25, s.d=5, lower=5, upper=80)
3. time of making a grande cup of coffee: Truncated Normal (mean=28, s.d=7, lower=5, upper=80)
4. time of making a venti cup of coffee:Truncated Normal (mean=30, s.d=8, lower=5, upper=80)

Main Purpose

1. How long is the barista’s break time when Johanna is in the coffee shop?

2. How long should Johanna wait to get her coffee?

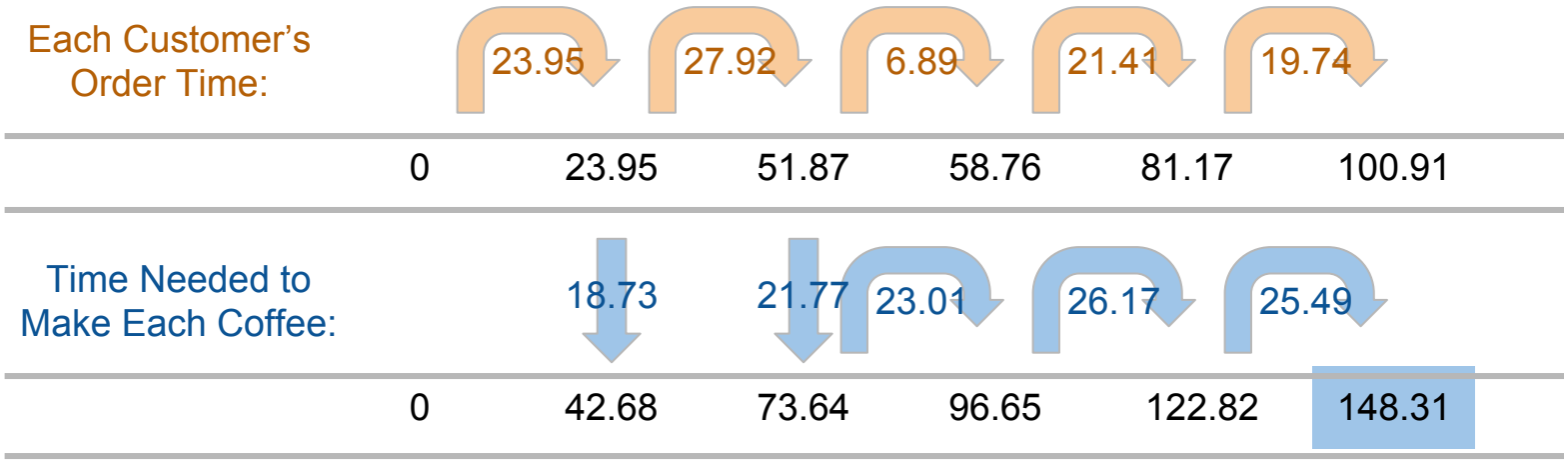
Calculating Barista's Break Time (in seconds)



The two grey arrows indicate barista's break time.

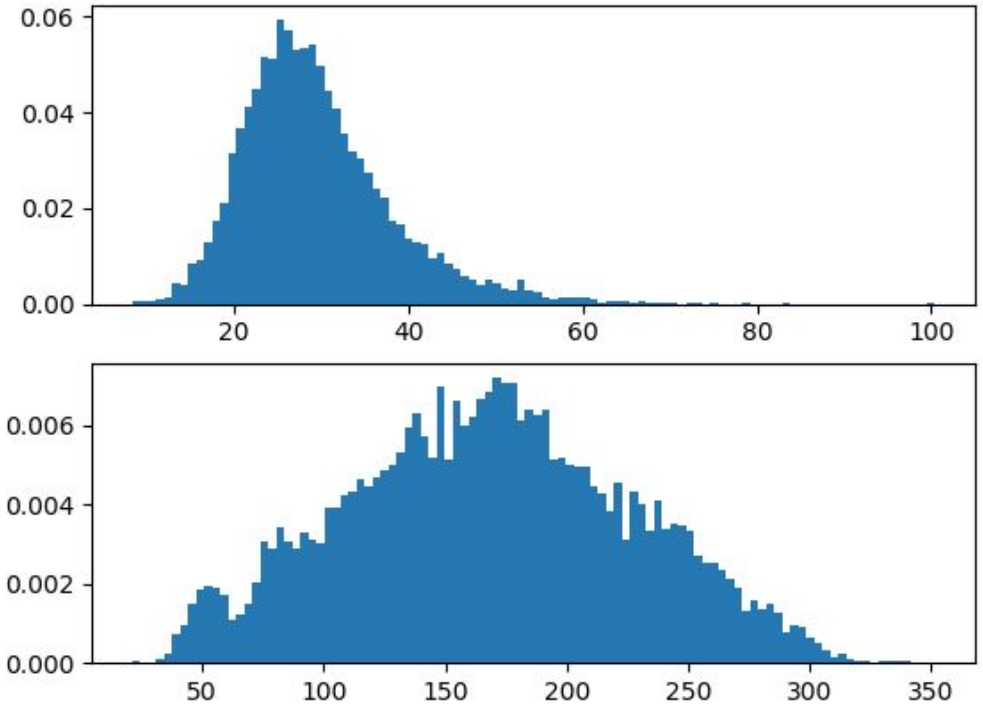
(23.95 - 0) + (51.87 - 42.68) = 33.14

Customer's Waiting Time (in seconds)



From Johanna getting into the line, to her getting coffee.

Distribution



count	10000	25%	23.65
mean	29.59	50%	28.24
std	8.69	75%	33.96
min	8.28	max	100.42

count	10000	25%	125.95
mean	168.15	50%	168.08
std	59.23	75%	209.63
min	20.91	max	351.67

Thank you