Homework 2

Building a probability model

Firstly, I am going to focus on:

- horsepower (continuous variable).
- fuel-type (categorical variable)

Defining random variables:
X: horsepower
Y: fuel-type

Model assumptions:
Simple random sampling.
Under simple random sampling, each observation is equal to be drawn from the population.

Marginal distribution:

$$X \rightsquigarrow \mathrm{Gamma}(\alpha, \lambda)$$

State space: [48, 288]

Mean: 104.26

Var: 1577.23

Std: 39.71

Min: 48

Max: 288

$$Y \rightsquigarrow \mathrm{B}(\mathrm{p})$$

State space: {gas, diesel}
p_{gas} = 0.9015
Mode: gas

Joint distribution:

Frequency table

Horsepower	Diesel	Gas
[48, 96)	15	89
[96, 144)	5	57
[144, 192)	0	31
[192, 240)	0	4
[240, 288]	0	2

Probability table

Horsepower	Diesel	Gas
[48, 96)	0.0739	0.4384
[96, 144)	0.0246	0.2808
[144, 192)	0	0.1527
[192, 240)	0	0.0197
[240, 288]	0	0.0099

Conditional distribution:

Horsepower	Diesel	Gas
[48, 96)	0.1442	0.8558
[96, 144)	0.0806	0.9194
[144, 192)	0	1
[192, 240)	0	1
[240, 288]	0	1