AI Assignment 3:

Hao Wen Ma 999738084

Question 1:

Question (a) P(b|a) = 0.09091 P(-b|a) = 0.90909

Question (b) P(c|a) = 0.09091 P(-c|a)) = 0.90909

Question (c) P(c|a,-e) = 0.11765 P(-c|a,-e)) = 0.88235

Question (d) P(c|a,-f) = 0.09091 P(-c|a,-f)) = 0.90909

Question 2:

(1) Conditional Independence: knowing the state of Starter System makes the state of Starter Motor irrelevant to the probability of Car cranks.

P(Car cranks = true| Starter System = okay, Starter Motor = okay) = P(Car cranks = true| Starter System = okay, Starter Motor = faulty) = 80.0

P(Car cranks = false| Starter System = okay, Starter Motor = okay) = P(Car cranks = false| Starter System = okay, Starter Motor = faulty) = 20.0

P(Car cranks = true| Starter System = faulty, Starter Motor = okay) = P(Car cranks = true| Starter System = faulty, Starter Motor = faulty) = 5.0

P(Car cranks = false| Starter System = faulty, Starter Motor = okay) = P(Car cranks = false| Starter System = faulty, Starter Motor = faulty) = 95.0

(2) Knowing Starter System = okay increases the probability that Battery voltage = strong, Starter Motor = okay, and Main fuse = okay

P(Battery voltage = strong) = 41.1
P(Battery voltage = strong| Starter System = okay) = 66.7

P(Starter Motor = okay) = 99.5
P(Starter Motor = okay| Starter System = okay) = 100.0

P(Main fuse = okay) = 99.0
P(Main fuse = okay| Starter System = okay) = 100.0

Knowing Starter Motor = faulty explains away the probability of Battery Voltage indicating Starter System.

P(Starter system = okay| Battery Voltage = strong) = 96.5
P(Starter system = okay| Battery Voltage = strong, Starter Motor = faulty) = 2.0

(3) Sequence of accumulated evidence items Fuel System = okay, Car Cranks = true, Air System = okay increases the probability that Car Starts = true.

P(Car Starts = true) = 28
P(Car starts = true| Fuel System = okay) = 30.9
P(Car starts = true| Fuel System = okay, Car Cranks = true) = 62.2
P(Car starts = true| Fuel System = okay, Car Cranks = true, Air System = okay) = 64.0

(4) Sequence of accumulated evidence items Fuel System = okay, Spark Timing = bad, Spark Quality = good causes the probability that Car Starts = true to increase and decrease.

P(Car Starts = true) = 28
P(Car starts = true| Fuel System = okay) = 30.9
P(Car starts = true| Fuel System = okay, Spark Timing = bad) = 29.2
P(Car starts = true| Fuel System = okay, Spark Timing = bad, Spark Quality = good) = 73.7