Assignment 4

Created	@February 7, 2023 10:16 AM
Class	TDT4171
Type	Assignment
Materials	
Reviewed	☐

Exercise 1

a) (i) does not correctly describe $P(Flavor, Wrapper, Shape)$ because if you know the shape, the probability of the wrapper would change. This network does not insinuate this. This is also the case from wrapper to shape. (ii) and (iii) represents the story correctly, because all dependencies are taken into account.

b) Out of (ii) and (iii), (iii) is the best representation for this problem, because it has the fewest CPT-tables it needs the implement, both saving memory space and complexity when calculating prbabilities.

c) Yes, if you know the shape, this does not change the probability of it having some wrapper (according to this network).

d) The probability that my candy has a red wrapper:

$$P(red) = 0.7 * 0.8 + 0.3 * 0.1 = 0.59$$

e) The probability of a red, round candy having flavor strawberry:

$$P(strawberry|red, round) = \frac{\#favorable}{\#possible} = \frac{0.7 * 0.8 * 0.8}{0.7 * 0.8 * 0.8 + 0.3 * 0.1 * 0.1} = \frac{448}{451} \approx 0.993$$

f) expected value of an unopened candy box:

$$E = 0.7s + 0.3a$$

Exercise 2

a)

$$U(x) = -e^{-x/R}$$
$$R = \$500$$
$$1 * U(\$500) = -e^{-500/500} = -0.368$$
$$0.6 * U(\$5000) + 0.4 * U(\$0) = 0.6 * (-e^{-5000/500}) + 0.4 * (-e^{0}) = -0.400$$

We see that the lottery-option gives the lowest expected utility, and therefore Mary (if she is rational) will choose the safest option, which is receiving $500 with a probability of 1

b) This equation is solved in GeoGebra

$$-e^{-100/R} = -0.5e^{-500/R} - 0.5$$
$$R \approx 152$$