COMP0024 Coursework

Question 1.

Graph 1:

	Complete Extension	Preferred Extension	Grounded Extension	Stable Extension
{}	✓	✓	✓	
{A1}				
{A2}				
{A3}				

Graph 2:

	Complete Extension	Preferred Extension	Grounded Extension	Stable Extension
{}	✓		✓	
{A1, A3}	✓	✓		✓
{A2, A4}	✓	✓		✓

Question 2.

Maximally consistent subsets:

$$\{A, B \cup E, D, \neg E, \neg\neg C \rightarrow B\}$$

$$\{\neg A \cap \neg B \cap \neg C, B \cup E, D, \neg\neg C \rightarrow B\}$$

$$\{\neg A \cap \neg B \cap \neg C, D, \neg E, \neg\neg C \rightarrow B\}$$

Minimally inconsistent subsets:

$$\{A, \neg A \cap \neg B \cap \neg C\}$$

$$\{\neg A \cap \neg B \cap \neg C, B \cup E, \neg E\}$$

Question 3.

Normalized combined basic probability assignment:

$$\{\alpha\}: 0.211$$
$$\{\beta\}: 0.316$$
$$\{\gamma\}: 0.237$$
$$\{\beta, \gamma\}: 0.237$$

Belief function:

$$\{\alpha\}: 0.211$$
$$\{\beta\}: 0.316$$
$$\{\gamma\}: 0.237$$
$$\{\alpha, \beta\}: 0.527$$
$$\{\alpha, \gamma\}: 0.448$$
$$\{\beta, \gamma\}: 0.79$$
$$\{\alpha, \beta, \gamma\}: 1$$

Plausibility function:

$$\{\alpha\}: 0.21$$
$$\{\beta\}: 0.552$$
$$\{\gamma\}: 0.473$$
$$\{\alpha, \beta\}: 0.763$$
$$\{\alpha, \gamma\}: 0.684$$
$$\{\beta, \gamma\}: 0.789$$
$$\{\alpha, \beta, \gamma\}: 1$$

Question 4.

Example	Sunny	Cold	Concert is on
e1	Y	N	Yes
e2	Y	Y	Yes
e3	N	Y	Yes
e4	N	N	No

Gain(Sunny) = I(2, 2) – E(Sunny) = 1 – 0.5 = 0.5

Gain(Cold) = I(2,2) – E(Cold) = 1 – 0.5 = 0.5

Since both gains are equal ID3 can choose either column as the root node. Let's assume we pick Sunny as the root node, yielding the following ID3 decision tree with 3 leaf nodes: