Question 1

The first sentence is true. An argument with logically false premises and a logically false conclusion is such an argument.

The second sentence is true. It's impossible that the conclusion of such an argument be false, so it's impossible that the premises of such an argument be true and the conclusion be false, so every such argument is valid.

The third sentence is false. *Every* argument with logically inconsistent premises is valid.

The fourth sentence is true. Here's an example:

> Ephraim is better than Damien at Halo.
> Kevin Rudd is the Prime Minister of Australia.
> _____
> There are no active volcanoes in Massachusetts.

Question 2

Here are some random examples:

Part (a)

{"Ephraim is better than Damien at Halo." "Kevin Rudd is not the Prime Minister of Australia."}

Part (b)

> Either penguins can fly or they can sing.
> Penguins can't fly.
> _____
> Penguins can sing.

Part (c)

It's not the case that either Aarti or Bram are hungry. Aarti isn't hungry and Bram isn't hungry.

Question 3

Part (b)

A: Bill will win the race. B: Gladys breaks a leg. C: Gladys has a hangover.

$$A \equiv (B \vee C)$$

Part (c)

A: Bill won the race because Gladys broke her leg.

$$A$$

Part (d)

One acceptable translation:

    A: Mary has a dog. *B*: Mary has a cat. *C*: Frank has a dog. *D*: Frank has a cat.

$$\sim ((A\&B) \vee (C\&D))$$

    Another one:

$$(\sim (A\&B)\& \sim (C\&D))$$

Part (e)

A: Methuselah is the oldest man. *B*: No man is older than Methuselah.

$$A \supset B$$

Part (f)

A: Some lawyers are dishonest. *B*: Some lawyers are not dishonest. *C*: I will not tell lawyer-jokes. *D*: People laugh at lawyer jokes.

$$((A\&B) \supset C)\&D$$

Question 4

I have indicated the main connective by double-lining it's column. I've also indicated the order in which the column's are calculated by numbering them.

A	*B*	$\sim$	(*A*	$\supset$	*B*)
T	*T*	*F*	*T*	*T*	*T*
T	*F*	*T*	*T*	*F*	*T*
F	*T*	*F*	*F*	*T*	*F*
F	*F*	*F*	*F*	*T*	*F*
		2	0	1	0

A	B	$(A$	$\vee$	$B)$	$\supset$	$(\sim$	B	$\supset$	$A)$
T	T	T	T	T	T	F	T	T	T
T	F	T	T	F	T	T	F	T	T
F	T	F	T	T	T	F	T	T	F
F	F	F	F	F	T	T	F	F	F
		0	1	0	3	1	0	2	0

Question 5

I've indicated the main connective and the order of calculation for the large formula at the end.

A	B	A	$\downarrow$	B	A	$\downarrow$	A	$(A$	$\downarrow$	$A)$	$\downarrow$	$(B$	$\downarrow$	$B)$
T	T	T	F	T	T	F	T	T	F	T	T	T	F	T
T	F	T	F	F	T	F	T	T	F	T	F	F	T	F
F	T	F	F	T	F	T	F	F	T	F	F	T	F	T
F	F	F	T	F	F	T	F	F	T	F	F	F	T	F
								0	1	0	2	0	1	0

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