Formalize each of the following statements as a binary expression.

(a) Everybody loves somebody sometime.
$$\forall p: \text{people} \cdot \exists q: \text{people} \cdot \exists t: \text{time} \cdot (p \text{ loves } q \text{ at time } t)$$

(b) Every 10 minutes someone in New York City gets mugged.
$$\forall t: \text{(10 minute intervals)} \cdot \exists p: \text{(people of New York City)} \cdot (p \text{ gets mugged at time } t)$$
More likely the speaker is trying to say
(a long time in minutes)
/ (the number of people in New York City who get mugged during that time)
= 10 approximately

(c) Every 10 minutes someone keeps trying to reach you.
$$\exists p: \text{people} \cdot \forall t: \text{(10 minute intervals)} \cdot (p \text{ tries to reach you at time } t)$$

(d) Whenever the altitude is below 1000 feet, the landing gear must be down.
$$\forall a: \text{real} \cdot a < 1000 \Rightarrow \text{(gear down)}$$

(e) I'll see you on Tuesday, if not before.
$$\text{Let } s \text{ be a predicate of time, so that } s t \text{ means I'll see you at time } t . \text{ If the given statement means I'll see you on Tuesday regardless of whether I see you before, then }$$
$$\exists t \cdot \text{now } < t \leq \text{Tuesday } \land s t$$

(f) No news is good news.
$$\text{Maybe this means the same as “There's no such thing as good news.”. If so, we might formalize it as }$$
$$\neg \exists n: \text{news} \cdot \text{good } n$$
where \text{news} is all the news and \text{good} is a predicate over \text{news} . But I think it was intended to mean the same as “The fact that there isn't any news is a piece of good news.”. I'll let \text{news: *char} be a bunch of texts. Then we might formalize it as
“\text{news=null}: \text{news } \land \text{good “news=null”}”
Or it might mean “If there isn't any news then that will be a piece of good news.”.
$$\text{news=null } \Rightarrow \text{“news=null”: news } \land \text{good “news=null”}$$
If “\text{news=null}: \text{news} then \text{news=null} is false, so “\text{news=null}” is false news, but there's no logical inconsistency.

(g) “I don't agree with anything you say.”
$$\text{Introduce prefix operators Iagreewith and Yousay} .$$
$$\forall x: \neg (\text{Iagreewith } x) \Leftarrow (\text{Yousay } x)$$

(h) “I don't agree with everything you say.”
$$\text{Introduce prefix operators Iagreewith and Yousay} . \text{ It seems to me there are two possible interpretations for the sentence. One is the same as part (a).}$$
$$\forall x: \neg (\text{Iagreewith } x) \Leftarrow (\text{Yousay } x)$$
The other is
$$\neg \forall x: (\text{Iagreewith } x) \Leftarrow (\text{Yousay } x)$$
They are not equivalent. To decide between them requires more context.