A. The odds for an event $A$ to occur is defined to be $P(A)/P(A^c)$. Odds are frequently used in betting on horse races, etc., in the following way:\footnote{This is simplified. Actual betting can be more complicated.} suppose there are 6 horses in a race, named $A$, $B$, $C$, ..., $F$. The odds against each horse being the winner (i.e. the odds for the horse to lose the race) is given ahead of the race, and the payoff is equal to the odds of the horse winning. For example, if the odds against the horses winning are

$$\text{odds}(A) = 3.5, \text{odds}(B) = 4.1, \text{odds}(C) = 10,$$

$$\text{odds}(D) = 10.5, \text{odds}(E) = 12.5, \text{odds}(F) = 13.5$$

and I bet $1 on $A$ winning, then if $A$ wins I get $3.5 (this includes my original stake of $1), whereas if $A$ does not win I lose my $1.

(i) According to the odds given above, what is the probability of each horse winning?

(ii) Do you find anything wrong with these probabilities?\footnote{These are the odds I found on an Internet gambling site.}

(iii) Suppose I bet $10 on the likely winner, $A$. What is my expected payoff, according to the odds given above?