Answer to the Question 9

From problem 3, we can say RNN Language models are valid which means

$$\sum_{w} p_n(w) = 1$$

Because for ensemble of RNN, $p(w) = \frac{1}{R}\sum_{n=1}^{R} p_n(w)$

Ensemble of RNN is also valid.

$$\sum_{w} p(w) = \sum_{w} \frac{1}{R}\sum_{n=1}^{R} p_n(w)$$

$$= \frac{1}{R}\sum_{n=1}^{R}\sum_{w} p_n(w)$$

$$= \frac{1}{R}\sum_{n=1}^{R} 1$$

$$= 1$$