1. An extremely distinct partition of $n$ is a sequence of integers

$$(\lambda_1, \lambda_2, \ldots, \lambda_t)$$

such that

$$\lambda_1 + \lambda_2 + \ldots + \lambda_t = n$$

and

$$\lambda_1 - \lambda_2 \geq 2 \quad \lambda_2 - \lambda_3 \geq 2 \quad \ldots \quad \lambda_{t-1} - \lambda_t \geq 2$$

and

$$\lambda_t > 0$$

Let $q(n)$ be the number of partitions of $n$, and $q(n, k)$ be the number of extremely distinct partitions of $n$ whose largest part is $k$.

(i) (5 points) Explain why

$$q(n, k) = \sum_{r=1}^{k-2} q(n-k, r)$$

and, of course

$$q(n, n) = 1$$

(ii) Use the above recurrence, and

$$q(n) = \sum_{k=1}^{n} q(n, k)$$

to compute $q(n)$ for $1 \leq n \leq 5$. 