**Quiz # 10 for Dr. Z.'s Number Theory**

**NAME:** (print!) _____

**E-MAIL ADDRESS:** (print!) _____

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

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

such that

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

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

$$\lambda_t > 0 \quad ,$$

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

(i) (5 points) Explain why

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

and, of course

$$q(n,n) = 1 \quad .$$

(ii) Use the above recurrence, and

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

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