11.10 (b) It is easy to show, that $(\hat{\beta} \cdot \vec{k})^{2k} = (\hat{\beta} \cdot \vec{k})^{2}$, $(\hat{\beta} \cdot \vec{k})^{2k+1} = (\hat{\beta} \cdot \vec{k})$, $k \ge 1$ Then. $emp\{-5 \hat{\beta} \cdot \vec{k}\} = \frac{1}{N_{10}} \frac{(-5)^{n}}{n!} (\hat{\beta} \cdot \vec{k})^{n}$ $= 1 + \frac{2}{k_{10}} \frac{(-5)^{2k+1}}{(2k+1)!} (\hat{\beta} \cdot \vec{k})^{2k+1} + \frac{1}{k_{10}} \frac{(-1)^{2k}}{(2k)!} (\hat{\beta} \cdot \vec{k})^{2k}$ $= 1 + (\hat{\beta} \cdot \vec{k}) \frac{2}{k_{10}} \frac{(-5)^{2k+1}}{(2k+1)!} + (\hat{\beta} \cdot \vec{k})^{2k} \frac{(-5)^{2k}}{(2k+1)!}$ $= 1 + (\hat{\beta} \cdot \vec{k}) \sinh(-5) + (\hat{\beta} \cdot \vec{k})^{2k} \left[\cosh(-5) - 1\right]$ $= 1 - (\hat{\beta} \cdot \vec{k}) \sinh(-5) + (\hat{\beta} \cdot \vec{k})^{2k} \left[\cosh(-5) - 1\right]$

Where we have use the expansion

$$sinh's = \sum_{k=0}^{\infty} \frac{3^{2k+1}}{(2k!)!}$$
, $cosh's = \sum_{k=0}^{\infty} \frac{3^{2k}}{(2k)!}$