Utregninger prosjekt 4

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$$\begin{aligned} Z &= \sum_i e^{-\beta E_i} \\ Z &= 2e^{8\beta J} + 2e^{-8\beta J} + 12 \end{aligned} \tag{1}$$

$$\begin{aligned} < E > &= \sum_i \frac{E_i e^{-\beta E_i}}{Z} \\ < E > &= \frac{1}{Z}(-16Je^{8\beta J} + 16Je^{-8\beta J}) \end{aligned} \tag{2}$$

$$\begin{aligned} < E^2 > &= \frac{1}{Z}\sum_i E_i^2 e^{-\beta E_i} \\ < E^2 > &= \frac{1}{Z}(128J^2 e^{8\beta J} + 128J^2 e^{-8\beta J}) \end{aligned} \tag{3}$$

$$< M > = \frac{1}{Z}\sum_i M_i e^{-\beta E_i} = 0 \tag{4}$$

$$\begin{aligned} < |M| > &= \frac{1}{Z}\sum_i M_i e^{-\beta E_i} \\ < |M| > &= 8e^{8\beta J} + 4 \end{aligned} \tag{5}$$

$$\begin{aligned} < M^2 > &= \frac{1}{Z}\sum_i M_i^2 e^{-\beta E_i} \\ < M^2 > &= \frac{1}{Z}(8e^{-8\beta j} + 16) \end{aligned} \tag{6}$$