$$M_X(t) = E\{e^{tX}\}$$

$$= \int_{\theta_1}^{\theta_2} \frac{e^{tx}\, dx}{\theta_2 - \theta_1}$$

$$= \left[\frac{e^{tx}}{t}\right]_{\theta_1}^{\theta_2} \frac{1}{\theta_2 - \theta_1}$$

$$= \frac{e^{\theta_2 t} - e^{\theta_1 t}}{t(\theta_2 - \theta_1)}$$

L'hopital's rule.

$$\lim_{t \to 0} M_X(t) = \lim_{t \to 0} \frac{1 + \theta_2 t + O(t^2) - 1 - \theta_1 t - O(t^2)}{t(\theta_2 - \theta_1)}$$