#2 (#4, pg. 465) (4 pts.)

$$E[e^{tX}] = \int_0^1 2xe^{tx}\,dx \qquad du = e^{tx}dx \quad v = \frac{1}{t}e^{tx} \qquad V = 2x \quad dv = 2dx$$

$$= \frac{2x}{t}e^{tx}\Big|_0^1 - \frac{2}{t}\int_0^1 e^{tx}\,dx$$

$$= \frac{2e^t}{t} - \frac{2}{t^2}e^{tx}\Big|_0^1$$

$$= \frac{2e^t}{t} - \frac{2e^t}{t^2} + \frac{2}{t^2}, \quad t \neq 0$$

$$\therefore \quad M_X(t) = \begin{cases} \dfrac{2e^t}{t} - \dfrac{2e^t}{t^2} + \dfrac{2}{t^2}, & t \neq 0 \quad \} \text{ 3 pts.} \\ 1, & t = 0 \quad \} \text{ 1 pt.} \end{cases}$$