

137.

$$M_{x+y}(t) = 0.09e^{-2t} + 0.24e^{-t} + 0.34 + 0.24e^t + 0.09e^{2t}$$

$$P(X \leq 0)$$

→ need  $M_x(t)$

$$M_{x+y}(t) = M_x(t)M_y(t) = \underbrace{M_x(t)}_{\text{independence}} \underbrace{M_x(t)}_{\text{identically distributed}}$$

→ so factor  $M_{x+y}(t)$

$$(0.3e^{-t} + 0.4 + 0.3e^t)(0.3e^{-t} + 0.4 + 0.3e^t)$$

$$M_x(t) = 0.3e^{-t} + 0.4 + 0.3e^t$$

$$M_x(t) = E(e^{tx}) = \sum_{x=-\infty}^{\infty} P(X=x)e^{tx}$$

$$E(e^{tx}) = 0.3e^{t(-1)} + 0.4e^{t(0)} + 0.3e^{t(1)}$$

$$P(X) = \begin{cases} 0.3 & x=-1 \\ 0.4 & x=0 \\ 0.3 & x=1 \end{cases}$$

$$P(X \leq 0) = P(X=-1) + P(X=0)$$

$$= 0.3 + 0.4$$

$$= 0.7$$

E