7.) $\mathbb{P}(\text{dividend} \mid X=4\ PY) = \dfrac{\mathbb{P}(\text{dividend}) \cdot \mathbb{P}(X=4 \mid \text{dividend})}{\mathbb{P}(X=4\ PY)}$

(0.8) $\mathbb{P}$

$\mathbb{P}(\text{no div} \cap X=4\ PY) + \mathbb{P}(\text{div} \cap X=4\ PY)$

$$= \frac{\mathbb{P}(\text{div}) \cdot \mathbb{P}(X=4 \mid \text{div})}{\mathbb{P}(\text{div}) \cdot \mathbb{P}(X=4 \mid \text{div}) + \mathbb{P}(\text{no div})\,\mathbb{P}(X=4 \mid \text{no div})}$$

$$= \frac{(0.8)(0.0403)}{(0.8)(0.0403)+(0.2)(0.0532)} = \boxed{0.7519}\ \checkmark$$

$\mathbb{P}(\text{div}) = 0.8$

$\mathbb{P}(\text{no div}) = 0.2$

$\mathbb{P}(X=4 \mid \text{div}) = \left(\dfrac{1}{\sqrt{2\pi(36)}}\right) e^{-(4-10)^2/2(36)} = 0.0403$

$\mathbb{P}(X=4 \mid \text{no div}) = \;''\; e^{-(4-0)^2/2(36)} = 0.0532$