2A

$$\frac{P(H|D)}{P(H^c|D)} = \frac{P(D|H)\cdot P(H)}{P(D)\cdot P(H^c|D)} = \frac{P(D|H)\,P(H)}{P(D\cap H^c)}$$

posterior odds

$$= \frac{P(D|H)}{P(D|H^c)} \cdot \frac{P(H)}{P(H^c)} \quad \checkmark$$

likelihood ratio

prior odds

2B UPDATE simultaneously:

$$\frac{P(D|+,+)}{P(D^c|+,+)} = \frac{P(+,+|D)}{P(+,+|D^c)} \cdot \frac{P(D)}{P(D^c)}$$

$$= \frac{(0.95)^2(.01)}{(0.05)^2(.99)} = 3.\overline{64}$$

(converted to probability) $\Rightarrow \frac{3.\overline{64}}{3.\overline{64}+1} \approx 0.784$ ✓

UPDATE sequentially:

$$\frac{P(D|+_1)}{P(D^c|+_1)} = \frac{P(+_1|D)}{P(+_1|D^c)} \cdot \frac{P(D)}{P(D^c)} = \frac{(.95)(.01)}{(.05)(.99)}$$

$$\frac{P(D|+_2)}{P(D^c|+_2)} = \frac{P(+_2|D)}{P(+_2|D^c)} \cdot \frac{P(D|+_1)}{P(D^c|+_1)} = \frac{(.95)}{(.05)}\cdot\frac{(.95)}{(.05)}\cdot\frac{(.01)}{(.99)}$$

$$= \frac{(0.95)^2(.01)}{(0.05)^2(.99)}$$