Katniss is practising archery. She fires three arrows at a target. The probability that she hits the target with her first arrow is 0.7. Whenever she hits the target, her confidence increases so that the probability that she hits the target on her next attempt increases by 0.1. Whenever she misses the target, the probability reduces by 0.1.
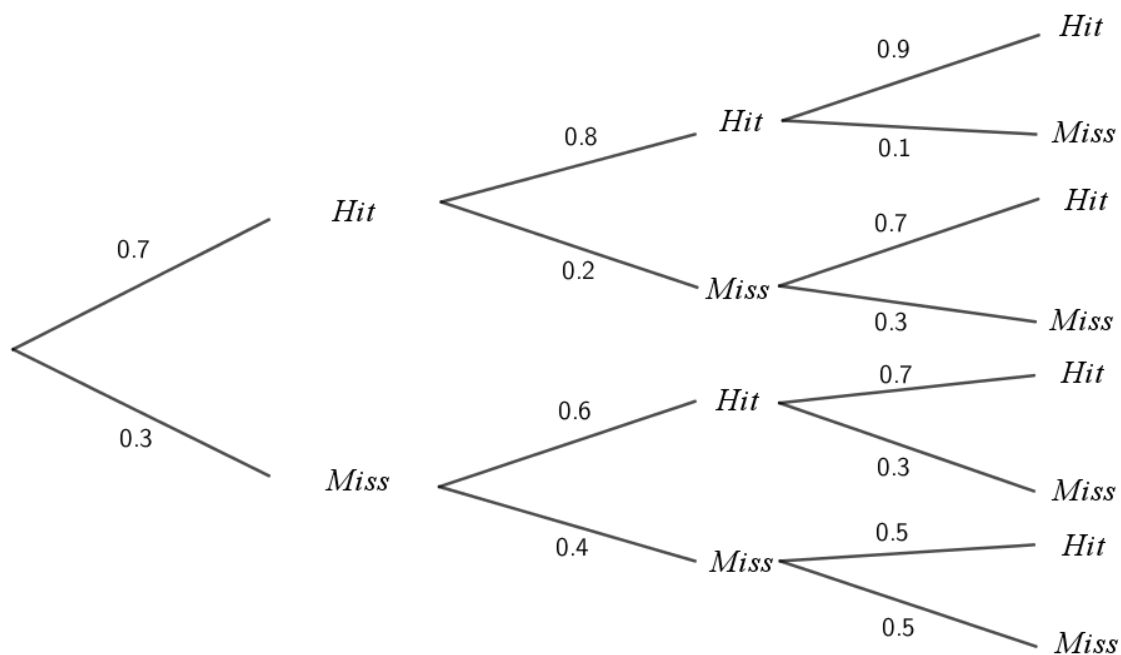
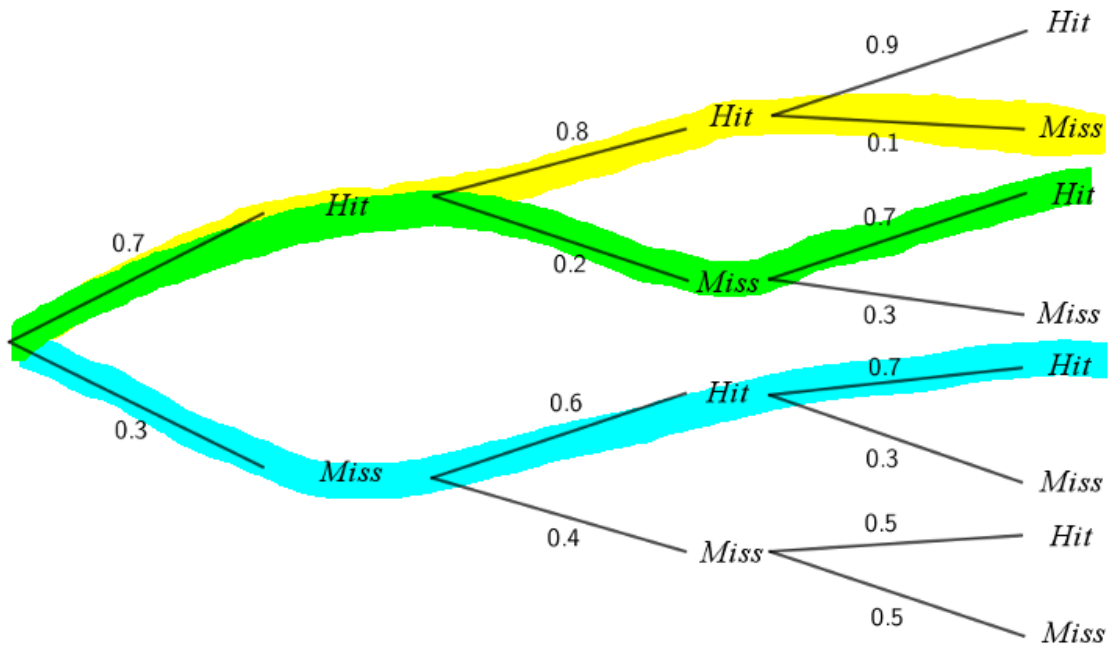a) Complete the probability tree for Katniss's three attempts.
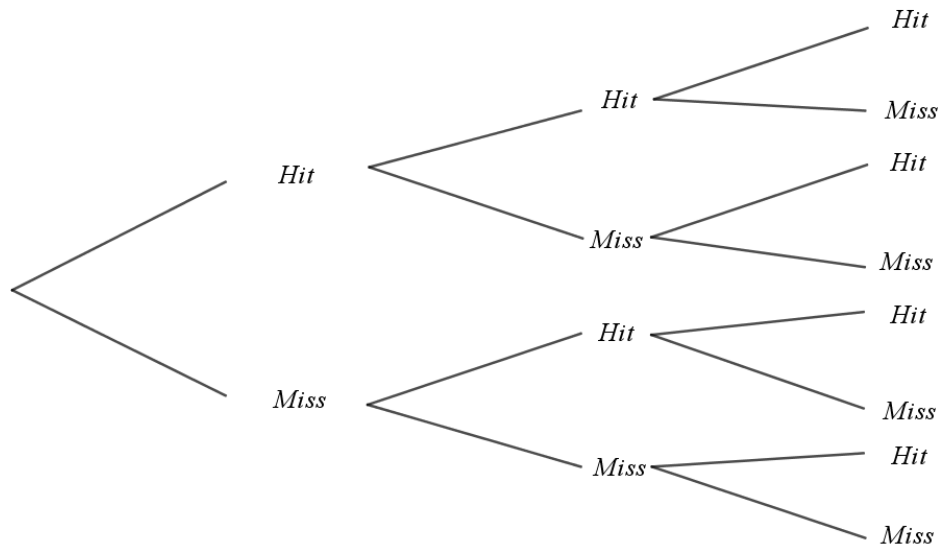
b) Calculate the probability that she hits the target with two attempts.

c) Find the probability the she hits the target on at least one attempt.

a)

b)

$$P(2 Hits) = P(HHM \text{ or } HMH \text{ or } MHH)$$

$$= 0.7 \times 0.8 \times 0.1 + 0.7 \times 0.2 \times 0.7 + 0.3 \times 0.6 \times 0.7$$

$$= 0.056 + 0.098 + 0.126$$

$$= 0.28$$

c)

$$P(at\ least\ 1\ Hit) = 1 - P(0\ Hits)$$

$$= 1 - P(MMM)$$

$$= 1 - 0.3 \times 0.4 \times 0.5$$

$$= 0.94$$