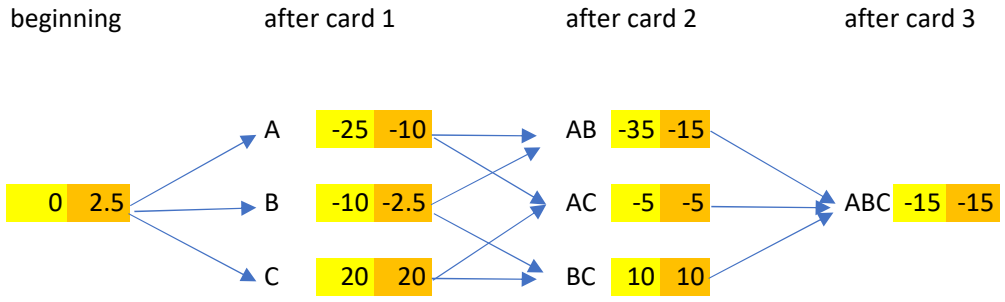
FINM 32000: Exam 2022 solutions

May 2023

(2a) Let A, B, C, denote the -25, -10, and +20 cards respectively. Then we have the following payoffs in yellow, and the optimized values in orange:



Expected total profit is 2.5.

(2b) The optimized expectation in that case is -2.5, which is better than -10, so it is not optimal to stop at time 1.

(3a) $\sqrt{(0.6^2 \times 0.2 + 0.43^2 \times 0.05)/0.25} \approx 0.57$

(3b) $C(0.57) \approx 1.42 + (-0.03)(9.43) + \frac{1}{2}(-0.03)^2(29.3) \approx 1.1503$

(3c) $C(0) = 0$ and Vega $= \partial C/\partial\sigma = 2S_0N'(\sigma\sqrt{T}/2)\sqrt{T}/2$ so Vega$(0) = S_0\sqrt{T}/\sqrt{2\pi}$

Therefore $C(\sigma) \approx C(0) + \sigma\text{Vega}(0) = \frac{1}{\sqrt{2\pi}}S_0\sigma\sqrt{T}$