Quiz 2

Your name:

Problem 1

Let X be stock, D be demand, c be a unit material cost, s be unit salvage value, p be a retail price.

> *In newsvendor setting, maximizing the expected profit is equivalent to minimizing the expected economic cost (sum of the expected overstock cost and the expected understock cost).*

Prove the above statement. `[20pts]` (Two problems being mathematically equivalent to each other implies that a solution that solves the one problem solves the other problem, and vice versa.)

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Problem 2

For an inventory operation, let S_t be the amount of stock at the end of day t. The (S, s) inventory policy is employed such that

- If $S_t \leq 1$, then order up to 4.
- If $S_t > 1$, then order nothing.

During a day of the operation, demand for the stock follows the following distribution.

d	0	1	2	3
$\mathbb{P}(D = d)$	1/8	1/4	1/2	1/8

1) Draw a DTMC transition diagram for S_t. `[15pts]`

2) What is $\mathbb{P}[S_{t+2} = 3 | S_t = 1]$? `[15pts]`

3) What is the long-run average of S_t? `[15pts]`

Problem 3

Find $\mathbf{P}^{100}$, where $\mathbf{P}$ is given as below.`[20pts]`

$$\mathbf{P} = \begin{bmatrix} .2 & .8 & 0 & 0 \\ .5 & .5 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & .5 & .5 \end{bmatrix}$$

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