CS 7643 Deep Learning Problem Set 0

1.
Based on the expected payouts. We can derive the following:

$$= \frac{2 - 1.5}{6}$$
$$= 0.125$$

True, they are expected to make money.

2.
Answer a

$$) \ C(x) = 2x^2 \text{ for } 0 \leq x \leq 1/2$$

The answer is not b since this equates to : $C(x) = -2x^2 + 4x - \frac{3}{2}$

3.
The answer is c

The integral wrt to infinity is always 0, therefore all terms with x will cancel out, leaving us with c.

4.
Answer is the following:

$$\bigcirc \begin{bmatrix} 0 \\ 0.358 \\ 0.269 \\ -0.215 \\ -0.448 \\ -0.448 \end{bmatrix}$$

5.

When you look at model B, it seems that the training score is much better than Model A, however the validation score is the same for both. This is likely due to Model B overfitting the data by introducing more bias and using more features / variables.

Therefore I would the say the answer is:

$$\text{Model A complexity} < \text{Model B complexity}$$

6.

Valid convex function:

○ $\min_{i=1}^{k} \mathbf{a}_i^t \mathbf{x}$ for $\mathbf{x} \in \mathbb{R}^n$, and a finite set of arbitrary vectors: $\{\mathbf{a}_1, \ldots, \mathbf{a}_k\}$

7.

Answer is

$$\text{A: } \hat{y} = \text{argmin}_y \sum_{i=1}^{n} (y - x_i)^2$$