

### Cross-Entropy Loss

On Friday, we worked out that Phil Thompson’s NFL Elo ratings (<https://philthompson.me/nfl-elo/2025.html>) gave the Seahawks a 54.4% chance of beating the Patriots in the Superbowl. They won. **Were our predictions good?**

Compute the log (base 2) of our probability for the Seahawks winning (0.544), then negate it: \_\_\_\_\_

Now fill in this table for some other possibilities. Find probabilities that give a small and a large cross-entropy loss.

Seahawks Probability	Winner	Cross-Entropy Loss
54.4%	Seahawks	0.877 bits
54.4%	Patriots	
50%	Seahawks	
_____ %	Seahawks	a small number: _____ bits
_____ %	Seahawks	a large number: _____ bits

Which situation would you describe as “confidently wrong”? How does the cross-entropy loss reflect that?

### Linear Layer Shapes

Suppose we have 100 examples with 2 features each, and we compute 3 output features using  $out = x @ w + b$ .

- $x$ .shape = \_\_\_\_\_
- $w$ .shape = \_\_\_\_\_
- $b$ .shape = \_\_\_\_\_

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Before you leave, pick a couple of these questions to react to:

- What was the most important concept from today for you?
- What was the muddiest concept today?
- How does what we did today connect with what you've learned before?
- What would you like to review or clarify next time we meet?
- What are you curious, hopeful, or excited about?

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