Exercise

We want to model a slot machine at a casino. Let's say the three outcomes, with probabilities, are

Outcome:	BIG WIN	SMALL WIN	LOSE
Probability:	$1/10$	θ	$9/10 - \theta$.
Amount:	x_B	x_S	x_L

1. Compute the MLE for θ, if you know the values for x_B, x_S, x_L.

2. What if instead we only observe the moods of the patrons leaving the casino. We can still model the slot machine inside, but now we have incomplete data. Let's say we observe x_H happy people walking out and x_D depressed people, where a person is happy if they won at all, and depressed if they lost. Introduce the hidden variable z_S as the number people who got small wins, and note that $x_B = x_H - z_S$. Derive the EM iterations for this setup.