

# Problem Set 5

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## Problem 1

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### A

- (a)  $P(x = 2) = 0.38$
- (b)  $P(Y = 2) = 0.54$
- (c)  $P(X = Y) = 0.3$
- (d)  $P(Y = 2|X = 2) = \frac{1}{19}$
- (e)  $P(X = 1|X + Y = 3) = \frac{2}{3}$
- (f)  $Exp(X) = 0.42 + 0.76 = 1.18$
- (g)  $Exp(Y) = 0.24 + 0.54 * 2 + 0.22 * 3 = 1.98$
- (h)  
 $Exp(2X + Y) = 0.06 * 1 + 0.1 * 2 + 0.04 * 3 + 0.1 * 3 + 0.24 * 4 + 0.08 * 5 + 0.08 * 5 + 0.2 * 6 + 0.1 * 7 = 4.34$

### B

$$X + Y = 1: 0.06$$

$$X + Y = 2: 0.20$$

$$X + Y = 3: 0.36$$

$$X + Y = 4: 0.28$$

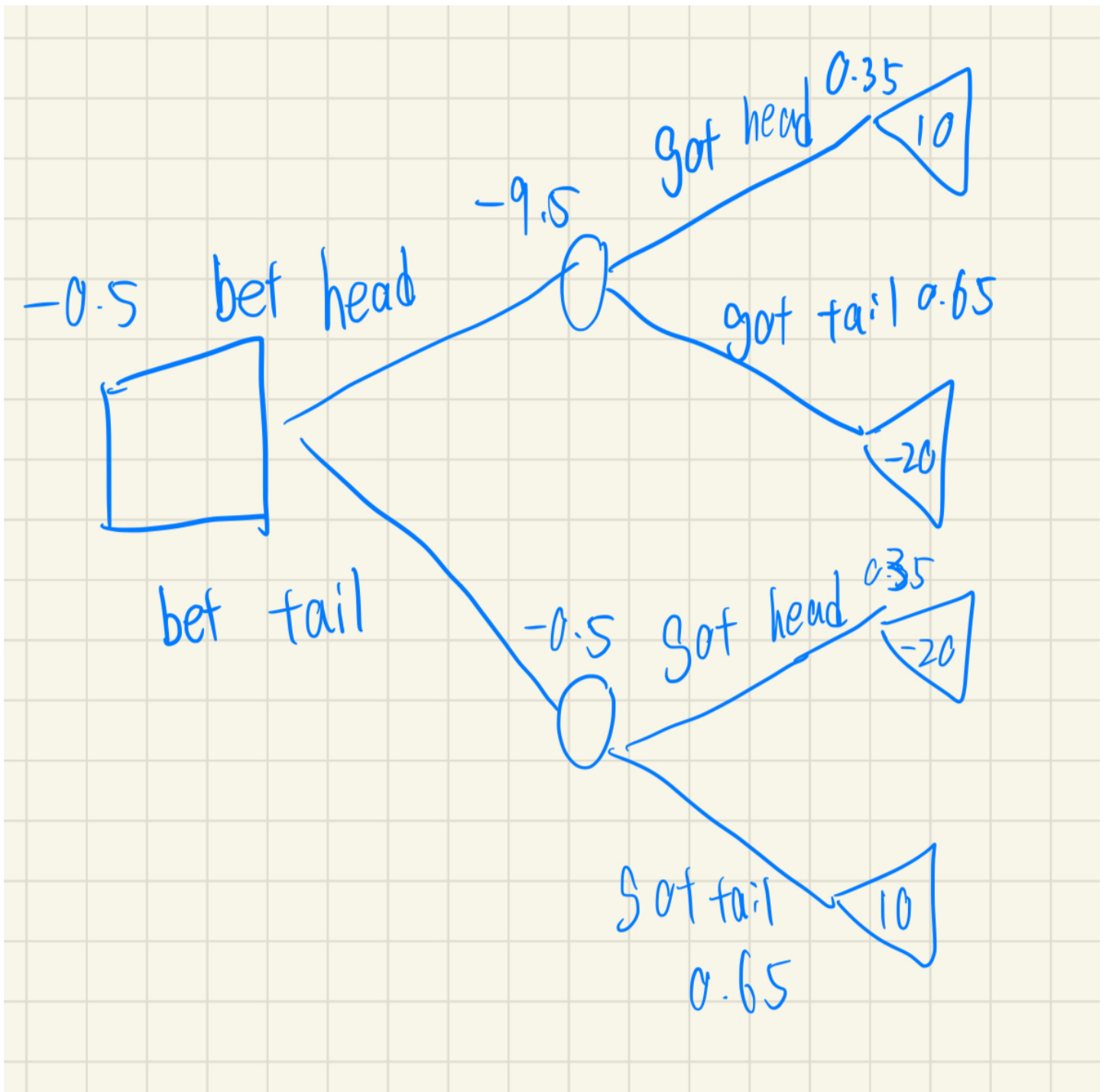
$$X + Y = 5: 0.10$$

$$0.06 + 0.2 * 2 + 0.36 * 3 + 0.28 * 4 + 0.1 * 5 = 3.16$$

## Problem 2

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### A

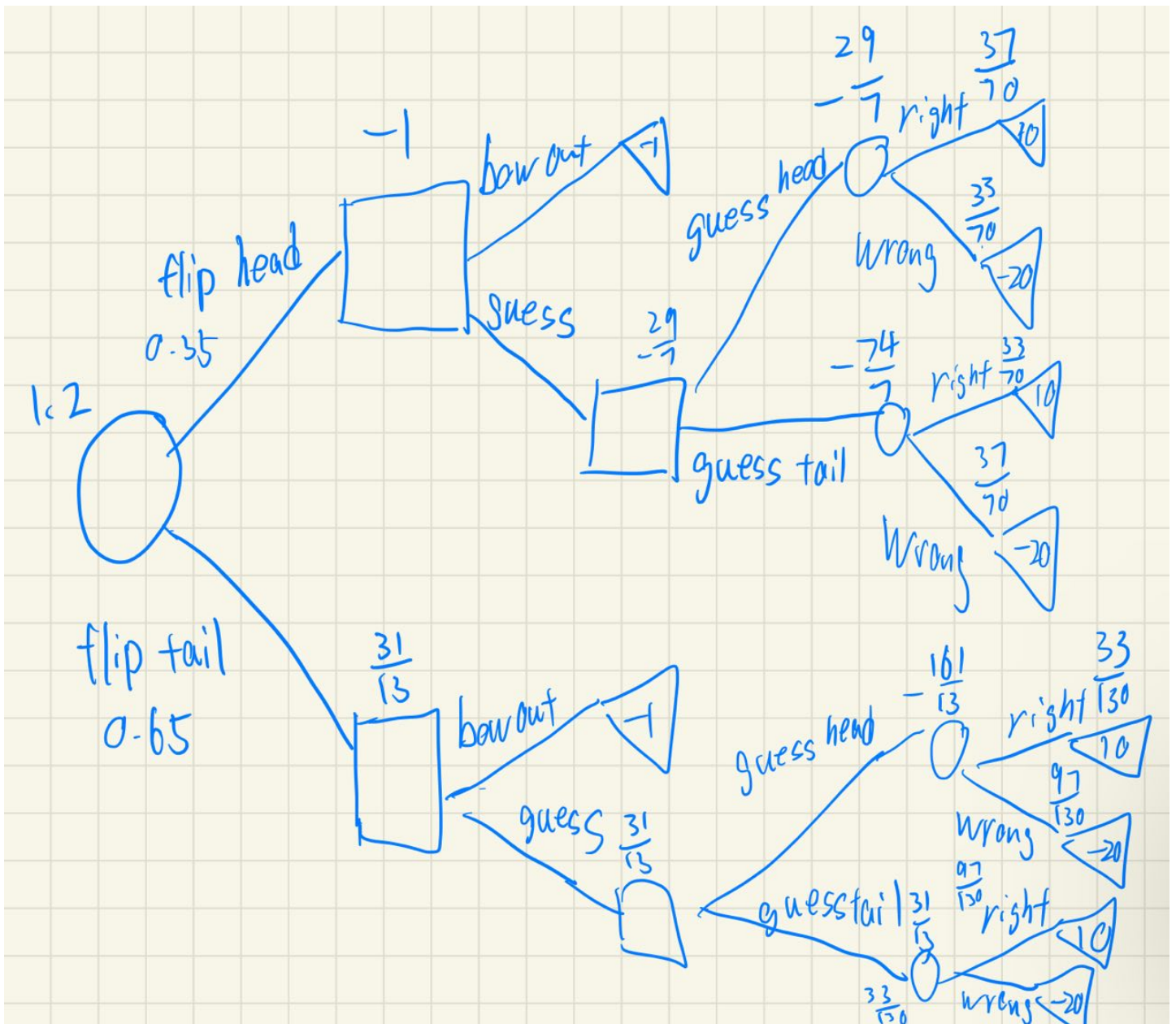


$$E(\text{BetHead}) = 0.5 * (0.1 * 10 + 0.9 * -20 + 0.6 * 10 + 0.4 * -20) = -9.5$$

$$E(\text{Bettail}) = 0.5 * (0.1 * -20 + 0.9 * 10 + 0.6 * -20 + 0.4 * 10) = -0.5$$

You shouldn't take this bet because nomatter what you bet, the expected profit are negative. (loss money)

**B**



Best strategy is: if first flip got head, then bow out. If flip got tail, guess tail. The expectation of profit is 1.2.