

#1

Converting Numbers to Hackenbush Strings with that value

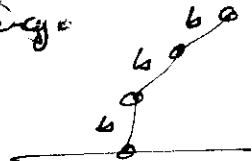
Given a number like $3\frac{5}{8}$, what Hackenbush string has that value?

There is a conversion process we can always use:

Recall + is blue and - red

Ex Convert $3\frac{5}{8}$ to a Hackenbush string

For the integer part (3) it is easy
this will be the base of the string.



For the fraction $\frac{5}{8} = \frac{4}{8} + \frac{1}{8} = \frac{1}{2} + \frac{1}{8}$

so as a base 2 expansion we get

$$0.\frac{1}{2} \frac{0}{4} \frac{1}{8}$$

Conversion Rules:

$$0 \rightarrow \text{blue segment}$$

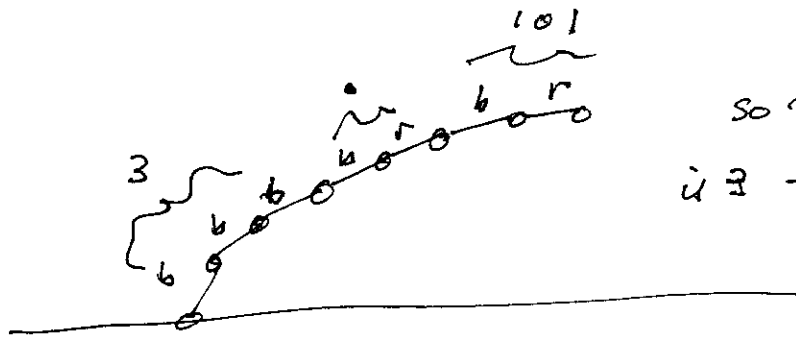
$$1 \rightarrow \text{red segment}$$

$$0 \rightarrow \text{blue segment}$$

$$1 \rightarrow \text{red segment}$$

(but always omit the last one from the string)

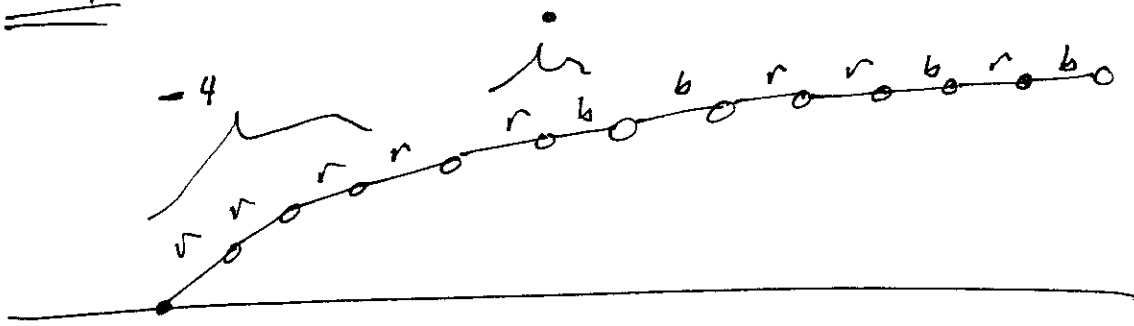
thus,



so value of this game is $3 + (\text{base 2 } 101 = \frac{5}{8})$

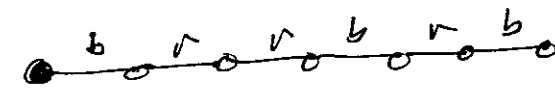
H3

Ex 6 what is the value of the game below?



integer part is -4

the fractional part converts as:



$$\bullet \quad 0 \quad 1 \quad 1 \quad 0 \quad 1 \quad 0 \quad + \frac{1}{\text{missing last 1}}$$

$$= 0 + \frac{1}{4} + \frac{1}{8} + 0 + \frac{1}{32} + 0 + \frac{1}{128}$$

$$= \frac{53}{128}$$

so game value is $-4 \frac{53}{128}$