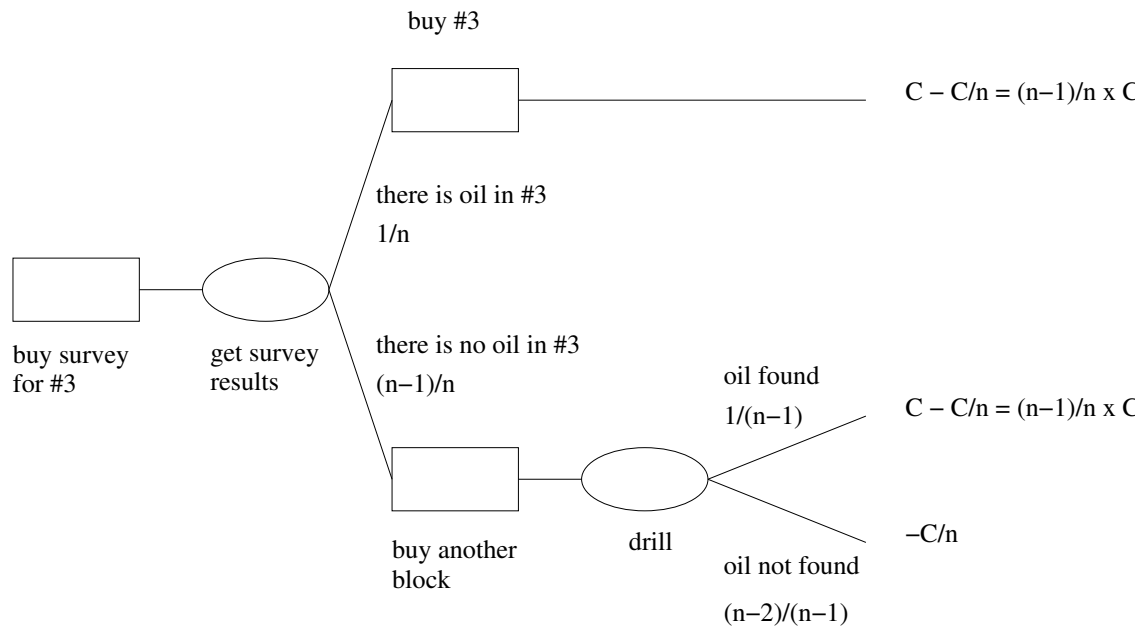**CS5811 Worksheet - Value of information**

- n blocks, C worth of oil in exactly one block, each block C/n dollars

- A seismologist offers the company the results of a survey of block number 3, which indicates definitely whether the block contains oil.

- How much should the company be willing to pay for the information?

buy #3

C − C/n = (n−1)/n x C

there is oil in #3
1/n

buy survey
for #3

get survey
results

there is no oil in #3
(n−1)/n

oil found
1/(n−1)

C − C/n = (n−1)/n x C

buy another
block

drill

oil not found

−C/n

(n−2)/(n−1)

The expected value (profit) for buying the survey for block 3:

$$\frac{1}{n} \times \frac{(n-1)C}{n} + \frac{(n-1)}{n} \times \frac{1}{(n-1)} \times \frac{(n-1)C}{n} + \frac{(n-1)}{n} \times \frac{(n-2)}{(n-1)} \times \frac{-C}{n}$$

$$= \frac{(n-1)C}{n^2} + \frac{(n-1)C}{n^2} + \frac{(n-2) \times (-C)}{n^2}$$

$$= \frac{C(n-1+n-1-n+2)}{n^2} = \frac{Cn}{n^2} = \frac{C}{n}$$