The questions refer to the source code "tape.py", which is a class to represent a tape in a Turing Machine.
Question 1
Calculate the Halstead Metrics and McCabe complexity for the methods in the class.

Halstead Metrics-
$V = N\log_2^n$
$D = (n1\ /2\ ) * (N2/n2)$

Init
$N1 = 9$
$N2 = 9$
$\eta1 = 2$
$\eta2 = 6$

$V = (9+9)\log_2^{\wedge}(2+6)$
$= 15\log_2^{\wedge}8 = 45$

$D = (2/2) * (9/6)$
$= 1.5$
$E = 67.5$

getsym
$N1 = 3$
$N2 = 5$
$\eta1 = 4$
$\eta2 = 4$

$V = (3+5)\log_2^{\wedge}(4+4)$
$= 8\log_2^{\wedge}8 = 24$

$D = (3/2) * (5/4)$
$= 0.625$
$E = 15$
writeleft
$N1 = 16$
$N2 = 18$
$\eta1 = 6$
$\eta2 = 10$

$V = (16+18)\log_2^{\wedge}(6+10)$
$= 34og_2^{\wedge}16 = 136$

$D = (6/2) * (18/10)$
$= 5.4$
$E = 734.4$

<u>writeright</u>
N1 = 13
N2 = 19
η1 = 6
η2 = 10

V = (13+19)log2^(6+10)
  = 32og2^16= 128

D = (6/2) * (19/10)
 = 5.7

E = 729.6

<u>Gettape</u>
n1 - 33
n2- 28
N1- 6
N2 - 17

V = (33+28)log2^(6+17)
  = 61og2^23= 136

D = (6/2) * (28/17)
 = 4.94

E = 671.84

McCabe -
Init - 1
Getsym - 1
Writeleft - 2
Writeright - 2
Gettape - 3?

Question 2
Calculate (manually) the Microsoft maintainability index for this class, based on your answers to question 1.
AvgE = 443.668
AvgV(G) = 1.8
Avg(CL) = 4
Avg(LOC) = 5.8

M1 = 171 − 3.42 ln (avgE) − 0.23 AvgV(G) − 16.2 Avg(LOC) + 0.99(Avg(CL))
= 171 − 3.42 ln (443.668) − 0.23(1.8) − 16.2(5.8) + 0.99(4)
= 59.7 (Green rating)

Question 3

How long (according to Halstead's formulas) will this class take to write? Do you think this is realistic?

$$T = \frac{E}{18}\text{seconds.}$$

Total time taken:
67.5/18 + 15/18 + 734.4/18 + 729.6/18 + 671.84/18
= 123.241 seconds.

It is unrealistic because there are definitely some human factors that would cause a delay in writing the code.

Question 4

Microsoft's version of the maintainability index does not take into account comment lines. Do you think this will make their maintainability index more or less accurate? Why?
This makes the index more accurate as the comments do not make the system more complex and hence harder to maintain.