1. At the CMI co-rec basketball league in the 10 games played team *Unit-disc* scored:

$$75, 76, 73, 75, 74, 73, 76, 73, 79$$

Assume that the number of points scored by *Unit-disc* is Normally distributed. Describe as precisely as you can what the below R-code is doing:

```
> fun = function(x, mu=0, sigma=1, alpha=0.95){
+ z = qnorm( (1-alpha)/2, lower.tail=FALSE)
+ sdx = sigma/sqrt(length(x))
+ N = pnorm((mean(x) - mu)/sdx,
+ lower.tail=FALSE)
+ c(mean(x) - z*sdx, mean(x) + z*sdx,  N)
+ }
> x=c(75,76,73,75,74,73,76,73,79) ;y = fun(x,76,1.5)
> y


[1] 73.9089069 75.8688709  0.9868659
```

2. Gobarkanth collects $X_1, X_2, X_3, \ldots, X_n$ of i.i.d measurements of radiation from Canteen's Gobar Gas plant. He assumes that the observations follow a Rayleigh distribution with parameter α, with p.d.f. given by

$$f(x) = \begin{cases} \alpha x \exp(-\frac{1}{2}\alpha x^2) & \text{if } x \geq 0, \\ \\ 0 & \text{otherwise.} \end{cases}$$

Find the maximum likelihood estimate for α.

4. In an experiment in breeding plants, a geneticist has obtained 219 brown wrinkled seeds, 81 brown roundseeds, 69 white wrinkled seeds and 31 white round seeds. Theory predicts that these types of seeds should be obtained in the ratios $9:3:3:1$. Assuming that the null hypothesis is given by the theory, execute a test that can check if there is enough evidence to reject the null hypothesis at 5% level of significance. We decide to use the following program in R

```
> x=-------
+ n=-------
+ prob=-------
+ Xsquanc = sum(((x-n*prob)^2)/(n*prob))
> Xsquanc
> T= pchisq(Xsquanc, df =----- -1,lower.tail=FALSE)
> T
```

to obtain the below output

```
[1] 2.733333
```

```
[1] 0.2549554
```

With adequate justification fill in the dotted lines in the code. Describe the output. Also decide if there is evidence to reject the null hypothesis.