université de BORDEAUX

ANNEE UNIVERSITAIRE 2019-2020
SESSION 1 D'AUTOMNE DECEMBRE 2019
MENTION : BIOINFORMATIQUE
Code UE : 4TBI705EX
Intitulé de l'épreuve : Biostatistiques EX
:
Date : 17/12/2019 **Heure : 14h30** **Durée :** 1h30
Documents : autorisés ~~/ non autorisés~~
Epreuve de M/Mme : Noguès/Thébault/Picoche

Collège Sciences et technologies

Masters

Exercice 1

In four colonies of birds of the same species, the production of an hormone ("H") is measured. The four colonies respectively live in jungle, on an island, in a village and in a zoo.
The measures are performed on 18 birds per colony.
You need to compare the means of hormone H between the colonies. Which series of statistical tests will you do? Justify your choices.

Exercice 2

On a given area, you are studying the relationship between tree species and the kind of ground. You count the oaks, birches, willows and pine trees. For each tree, you note whether the ground is mainly composed of peat, granit or limestone. You get the following contingency table:

	Oak	Birch	Willows	Pine trees
Peat	28	156	326	12
Granit	63	102	165	403
Limestone	159	72	27	37

A Fisher's exact test provides the following results:

```
        Fisher's Exact Test for Count Data
data:  Arbres
p-value = 0.0004998
alternative hypothesis: two.sided
```

Write the result and conclusion sections like in a report.
You can propose to perform some complementary statistical tests if it can strengthen what you write.

Oaks=Chênes, Birches=Bouleaux, Willows=Saules, Pine trees=Pins, Peat=Tourbe, Granit=Granite, et Limestone=Calcaire.

Exercice 3

Some protein kinases C are known to translocate from cytosol to the cellular membrane. In 20 homogenates of muscular cells, you quantify (in pm/min/mg proteins) the cytosolic and membrane bound activities of this enzyme family (after separation by ultracentrifugation). You study the relation between these two activities and you want to predict membrane bound activity knowing cytosolic activity. After checking the conditions of use of the analyses, you find:

```
> cor.test(Cytosol, Membrane)
        Pearson's product-moment correlation
data:  Cytosol and Membrane
t = -2.7379, df = 18, p-value = 0.01352
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.7941866 -0.1311861
sample estimates:
       cor
-0.5422291

> ResLM = lm(Membrane ~ Cytosol)
> summary(ResLM)
Call:
lm(formula = Membrane ~ Cytosol)
Residuals:
    Min      1Q  Median      3Q     Max
-4.7038 -1.9057 -0.3519  1.8799  2.9227

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  16.7053     2.5835   6.466  4.4e-06 ***
Cytosol      -0.9050     0.3305  -2.738   0.0135 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.254 on 18 degrees of freedom
Multiple R-squared:  0.294,     Adjusted R-squared:  0.2548
F-statistic: 7.496 on 1 and 18 DF,  p-value: 0.01352
```

Interpret the results.