

# Practica - día 1

## Estimadores, Histogramas y Test paramétricos

# Estimadores

- Cargar archivo CdP\_2014\_2015.csv

|    | date       | AVG.Temp | AVG.Press | AVG.Cond   | AVG.Salinity | AVG.DO     | AVG.rawO2 | AVG.OxySat | AVG.pH   | AVG.Redox |
|----|------------|----------|-----------|------------|--------------|------------|-----------|------------|----------|-----------|
| 1  | 2014-01-01 | 3.997746 | 9.621590  | 0.04066501 | 0.03042613   | 13.6469708 | 557.82569 | 104.248987 | 8.132615 | 355.7024  |
| 2  | 2014-01-02 | 4.057667 | 3.944666  | 0.03989884 | 0.02982348   | 13.6054204 | 557.26513 | 104.094670 | 8.105203 | 358.5334  |
| 3  | 2014-01-03 | 4.133612 | 3.991833  | 0.03766908 | 0.02809732   | 13.5890704 | 558.59725 | 104.175588 | 8.045604 | 359.7074  |
| 4  | 2014-01-04 | 4.188685 | 3.945495  | 0.03458220 | 0.02574459   | 13.5772362 | 559.54973 | 104.233405 | 7.972540 | 361.7077  |
| 5  | 2014-01-05 | 4.346172 | 9.391423  | 0.03129767 | 0.02324373   | 13.5092259 | 561.28899 | 104.137267 | 7.902103 | 357.6429  |
| 6  | 2014-01-06 | 4.392661 | 9.359303  | 0.03112603 | 0.02310512   | 13.4251303 | 559.00467 | 103.614006 | 7.892637 | 358.9344  |
| 7  | 2014-01-07 | 4.362913 | 9.504405  | 0.03243558 | 0.02408953   | 13.3680218 | 555.87506 | 103.094032 | 7.899868 | 360.8471  |
| 8  | 2014-01-08 | 4.331744 | 9.513480  | 0.03586842 | 0.02667286   | 13.3851731 | 555.77642 | 103.143718 | 7.960108 | 362.3139  |
| 9  | 2014-01-09 | 4.262987 | 3.962276  | 0.03511559 | 0.02612852   | 13.3216740 | 550.94440 | 102.470754 | 7.926953 | 366.3026  |
| 10 | 2014-01-10 | 4.309596 | 3.938767  | 0.03393367 | 0.02522467   | 13.3098721 | 551.65683 | 102.504005 | 7.942603 | 364.9555  |
| 11 | 2014-01-16 | 4.517913 | 3.363137  | 0.03132392 | 0.02323317   | 13.2591788 | 554.87535 | 102.668186 | 7.881645 | 361.9164  |
| 12 | 2014-01-17 | 4.465651 | 4.118095  | 0.03219935 | 0.02389348   | 13.1818813 | 550.35581 | 101.931410 | 7.890480 | 365.3861  |
| 13 | 2014-01-18 | 4.469518 | 4.056930  | 0.03246309 | 0.02408930   | 13.1287015 | 548.23037 | 101.530511 | 7.885162 | 368.2655  |
| 14 | 2014-01-19 | 4.428739 | 4.088367  | 0.03264400 | 0.02423248   | 13.1026564 | 546.10438 | 101.221678 | 7.874170 | 368.7347  |
| 15 | 2014-01-20 | 4.321483 | 4.213361  | 0.03331708 | 0.02475942   | 13.2027345 | 547.52692 | 101.710071 | 7.905469 | 367.7746  |
| 16 | 2014-01-21 | 4.259326 | 4.208682  | 0.03375062 | 0.02509925   | 13.1788081 | 544.94319 | 101.361370 | 7.924879 | 365.7413  |
| 17 | 2014-01-22 | 4.294506 | 4.171601  | 0.03408283 | 0.02534054   | 13.1448323 | 544.43610 | 101.193225 | 7.914286 | 366.3352  |
| 18 | 2014-01-23 | 4.316840 | 4.267291  | 0.03413932 | 0.02535955   | 13.1607066 | 545.66876 | 101.373776 | 7.913943 | 366.5150  |
| 19 | 2014-01-24 | 4.290891 | 4.305932  | 0.03454492 | 0.02568879   | 13.2298490 | 547.87399 | 101.838171 | 7.932011 | 365.3016  |
| 20 | 2014-01-25 | 4.361384 | 4.294321  | 0.03478333 | 0.02584933   | 13.2052910 | 548.66987 | 101.836574 | 7.952133 | 363.7011  |
| 21 | 2014-01-26 | 4.416692 | 4.277964  | 0.03507233 | 0.02605117   | 13.2791817 | 553.17442 | 102.554780 | 7.958724 | 364.1844  |
| 22 | 2014-01-27 | 4.442355 | 4.175539  | 0.03490600 | 0.02591479   | 13.3658215 | 557.44051 | 103.292503 | 7.979201 | 362.8344  |
| 23 | 2014-01-28 | 4.327446 | 4.102681  | 0.03454488 | 0.02567942   | 13.4005045 | 555.87842 | 103.250258 | 7.984012 | 362.7155  |
| 24 | 2014-01-29 | 4.223846 | 11.811125 | 0.03438276 | 0.02557835   | 13.3959762 | 553.57077 | 102.936218 | 7.977871 | 352.1811  |
| 25 | 2014-01-30 | 4.085160 | 11.892951 | 0.03415852 | 0.02544725   | 13.4839054 | 553.59471 | 103.236990 | 7.982600 | 354.1349  |
| 26 | 2014-01-31 | 4.117787 | 3.914238  | 0.03416635 | 0.02543630   | 13.4008836 | 550.42603 | 102.688670 | 8.007501 | 360.2274  |
| 27 | 2014-02-01 | 4.167867 | 3.917476  | 0.03387923 | 0.02521845   | 13.4692567 | 554.53844 | 103.347788 | 8.006673 | 360.1693  |

- Datos físico-químicos del embalse de Cuerda del Pozo de los años 2014 y 2015. Seleccionar la temperatura de verano de 2014 y de 2015 (meses Julio, Agosto y Septiembre):
  - Ayuda!!! Formatear fecha y trabajar con la fecha.
  - as.Date
  - format(date, "%m")
- Calcular:
  - La media y la desviación estándar.
  - Nº de observaciones.
  - Varianza

# Test paramétricos

- Realizar a las dos distribuciones que tenemos, verano2014 y verano2015 los test:
- Test t de Student para la comparación de las medias.
  - Nos interesa el valor del estadístico y el valor de  $p(x|H_0)$ .
  - Función implementada en R  $\rightarrow$  "t.test"
  - A mano:

$$\sigma^2 = \sigma_X^2 = \sigma_Y^2,$$

$$S^2 = \frac{(n_X - 1)S_X^2 + (n_Y - 1)S_Y^2}{n_X + n_Y - 2}$$

$$\frac{(\bar{X} - \bar{Y}) - (\mu_X - \mu_Y)}{\sqrt{S^2 \left( \frac{1}{n_X} + \frac{1}{n_Y} \right)}} \sim t_{n_X + n_Y - 2}$$

- Comando de R  $\rightarrow$  "pt"

- Test F para la comparación de la varianzas.
  - Nos interesa el valor del estadístico y el valor de  $p(x|H_0)$ .
  - Función implementada en R  $\rightarrow$  var.test
  - A mano:

$$F = \frac{S_1^2}{S_2^2} \sim F_{n_1 - 1, n_2 - 2},$$

- Comando de R  $\rightarrow$  "pf"

# Bootstrap y Jackknife

- Juntar ambas distribuciones en una sola y calcular:
  - La media y la desviación estándar.
  - Nº de observaciones.
  - Varianza

- Calcular mediante las técnicas de bootstrap y de jackknife:

- La media.
- La desviación estándar.
- El sesgo.

$$\bar{\Theta}_B = \frac{1}{M} \sum_{i=1}^M \bar{\Theta}_i$$

$$SD = \sqrt{\frac{1}{M} \sum_{i=1}^M (\bar{\Theta}_i^B - \bar{\Theta})^2}$$

$$Sesgo(\bar{\Theta}) \approx \frac{1}{M} \sum_{i=0}^M \Theta_i^B - \bar{\Theta}$$

- Compara con los resultados obtenidos inicialmente

- Analiza todos los resultados que has obtenido.

- Ayuda!!!
- Carga los datos dat1.dat y dat2.dat
- Calcula: media, desviación estándar y Varianza
- realiza los test  $t$  y  $F$  con los comandos de R y analiza también todos los resultados.