

Guía práctica número 6

temas: Selección gráfica de la distribución y estimaciones de máxima verosimilitud

Consigna 1: Realizar un resumen de los parámetros requeridos en cada una de las siguientes distribuciones.

- Binomial
- Discreta Uniforme
- Binomial Negativa
- Hipergeométrica
- Uniforme
- Normal
- Exponencial
- Lognormal
- Weibull
- Gamma

Consigna 2: Investigar sobre la creación de histogramas y la función gaussian_kde en python.

kde gaussiano:

https://docs.scipy.org/doc/scipy/reference/generated/scipy.stats.gaussian kde.html

Consigna 3: graficar las sigiuientes muestras de datos, y clasificarlas segun la distribución de probabilidad a la que pertenecen.

Consigna 4: Hallar los MLE para cada muestra de datos e imprimir el resultado por consola.

Muestra de datos:

Discretas:

```
1) [4, 8, 6, 5, 3, 3, 3, 7, 5, 6, 2, 8, 7, 4, 4, 4, 4, 5, 5, 4, 5, 3, 4, 4, 5, 6, 4, 5, 5, 2, 5, 3, 3,
8, 8, 6, 4, 3, 6, 5, 3, 5, 2, 7, 4, 6, 4, 5, 5, 4, 8, 6, 7, 7, 5, 7, 3, 4, 2, 4, 5, 4, 7, 4, 4, 5, 3,
6, 3, 8, 6, 4, 1, 6, 6, 6, 6, 3, 4, 3, 7, 6, 4, 3, 4, 4, 6, 6, 7, 5, 3, 6, 6, 5, 6, 5, 5, 5, 5, 2, 3, 2,
6, 4, 5, 7, 4, 5, 6, 4, 3, 4, 3, 7, 6, 6, 7, 6, 4, 7, 5, 6, 7, 4, 3, 4, 5, 6, 7, 1, 5, 5, 4, 3, 4, 7,
4, 5, 6, 4, 8, 8, 4, 5, 4, 4, 2, 5, 5, 2, 4, 7, 4, 3, 5, 8, 4, 6, 6, 4, 6, 4, 6, 6, 5, 3, 7, 4, 4, 2,
5, 6, 2, 5, 4, 6, 4, 6, 5, 7, 3, 4, 3, 7, 7, 4, 6, 6, 5, 5, 4, 3, 7, 7, 6, 4, 4, 6, 7, 7, 6, 6, 3, 3,
7, 5, 1, 3, 6, 1, 3, 5, 6, 6, 4, 6, 4, 4, 6, 6, 7, 6, 5, 3, 4, 4, 4, 8, 5, 7, 6, 6, 5, 5, 5, 4, 6, 4,
2, 6, 4, 7, 8, 7, 4, 2, 7, 5, 8, 8, 7, 4, 5, 7, 4, 3, 5, 7, 6, 5, 3, 5, 9, 3, 5, 7, 6, 6, 6, 4, 4, 6,
6, 7, 7, 5, 5, 6, 6, 6, 6, 7, 4, 4, 3, 5, 2, 5, 5, 4, 5, 2, 2, 6, 4, 3, 5, 6, 4, 5, 3, 2, 5, 5, 6, 6,
8, 5, 4, 6, 4, 5, 3, 2, 8, 7, 6, 5, 4, 3, 4, 5, 6, 6, 4, 8, 6, 5, 5, 5, 4, 4, 6, 2, 3, 2, 2, 7, 6, 5,
3, 5, 5, 4, 5, 5, 5, 6, 2, 4, 6, 5, 7, 6, 3, 3, 6, 2, 5, 7, 5, 5, 6, 5, 5, 7, 5, 8, 7, 4, 3, 3, 2, 3,
6, 3, 4, 7, 2, 6, 4, 3, 6, 6, 7, 6, 6, 4, 4, 6, 6, 9, 5, 4, 6, 4, 7, 7, 5, 6, 6, 3, 7, 5, 6, 4, 7, 5,
2, 7, 3, 4, 8, 8, 5, 6, 5, 4, 4, 6, 6, 6, 6, 3, 5, 3, 5, 5, 7, 4, 3, 3, 6, 5, 3, 3, 6, 3, 6, 6, 3, 3,
8, 4, 4, 6, 8, 8, 6, 4, 3, 6, 5, 5, 7, 3, 5, 2, 5, 3, 3, 3, 6, 6, 5, 8, 4, 4, 7, 4, 8, 2, 8, 2, 7, 5,
9, 3, 5, 8, 5, 6, 6, 5, 6, 5, 7, 2, 4, 8, 7, 5, 5, 4, 4, 5, 4, 5, 3, 8, 8, 6, 5, 4, 6, 6, 3, 7, 6, 8,
6, 5, 5, 7, 7, 2, 2, 4, 6, 8, 3, 5, 5, 8, 7, 7, 5, 5, 4, 3, 7, 6, 10, 9, 5, 6, 7, 7, 4, 5, 3, 8, 5,
4, 6, 5, 4, 3, 6, 5, 6, 5, 7, 5, 5, 7, 5, 3, 2, 6, 5, 6, 4, 3, 2, 4, 5, 5, 5, 7, 4, 5, 6, 5, 5, 7, 8,
```



2) [4, 6, 3, 5, 1, 5, 6, 6, 1, 2, 1, 4, 3, 2, 1, 5, 2, 2, 1, 2, 5, 6, 2, 6, 5, 1, 3, 2, 3, 5, 2, 6, 4, 3, 2, 3, 2, 1, 6, 3, 4, 4, 5, 2, 3, 5, 3, 2, 4, 1, 4, 5, 6, 1, 5, 2, 1, 5, 2, 4, 6, 2, 3, 2, 2, 6, 3, 5, 5, 2, 3, 3, 6, 4, 5, 6, 1, 5, 6, 5, 4, 1, 4, 1, 2, 6, 1, 4, 5, 1, 6, 1, 3, 5, 6, 6, 2, 4, 2, 6, 5, 1, 1, 5, 6, 1, 1, 1, 4, 4, 3, 2, 5, 5, 5, 3, 4, 6, 6, 3, 6, 5, 2, 1, 4, 4, 3, 4, 5, 6, 5, 3, 5, 6, 2, 3, 2, 1, 2, 1, 1, 2, 3, 6, 5, 5, 6, 1, 1, 3, 4, 2, 1, 5, 3, 2, 3, 2, 2, 6, 1, 3, 3, 6, 5, 5, 1, 1, 4, 6, 5, 2, 3, 1, 3, 3, 4, 5, 1, 3, 1, 2, 4, 2, 1, 1, 5, 3, 3, 2, 4, 6, 3, 5, 2, 2, 6, 5, 4, 5, 4, 5, 5, 1, 2, 5, 6, 5, 3, 2, 3, 2, 3, 5, 5, 1, 6, 3, 4, 1, 3, 3, 1, 5, 3, 5, 1, 5, 2, 4, 3, 6, 4, 5, 3, 5, 2, 1, 3, 2, 2, 3, 5, 6, 2, 4, 2, 6, 5, 5, 4, 2, 5, 6, 3, 1, 1, 1, 2, 4, 5, 3, 6, 3, 6, 2, 1, 2, 4, 4, 6, 5, 5, 6, 4, 4, 4, 2, 4, 3, 1, 4, 6, 1, 2, 6, 1, 6, 2, 3, 2, 2, 6, 5, 4, 4, 3, 3, 4, 5, 4, 5, 3, 1, 6, 3, 3, 2, 2, 2, 6, 2, 5, 4, 1, 3, 5, 1, 5, 5, 3, 4, 2, 6, 4, 6, 3, 3, 3, 1, 6, 4, 4, 5, 5, 5, 3, 4, 6, 3, 1, 5, 3, 3, 1, 2, 4, 6, 2, 5, 3, 1, 1, 4, 2, 4, 3, 4, 6, 1, 1, 5, 5, 3, 6, 2, 4, 3, 5, 4, 5, 4, 2, 3, 4, 6, 1, 6, 6, 1, 6, 4, 4, 4, 1, 6, 1, 4, 6, 6, 5, 5, 2, 3, 5, 1, 5, 2, 6, 2, 6, 6, 3, 5, 1, 1, 4, 6, 1, 3, 6, 3, 1, 1, 4, 1, 6, 6, 6, 4, 4, 1, 2, 2, 4, 1, 2, 1, 1, 1, 5, 6, 1, 5, 4, 2, 6, 2, 6, 2, 6, 2, 2, 2, 2, 4, 1, 3, 5, 3, 3, 6, 1, 6, 1, 1, 2, 4, 2, 4, 6, 4, 6, 3, 3, 4, 4, 6, 2, 6, 2, 3, 1, 4, 2, 6, 3, 2, 6, 4, 4, 5, 1, 5, 3, 2, 3, 6, 4, 5, 5, 5, 3, 4, 2, 6, 2, 3, 6, 5, 1, 3, 3, 4, 2, 3, 3, 5, 5, 6, 1, 4, 1, 6, 5, 2, 5, 4, 5, 4, 4, 4, 6, 4, 4, 2, 1, 3, 1, 4, 2, 5, 2, 4, 2, 2, 4, 6, 2, 3, 3, 2, 6, 5, 4, 3, 5, 2, 5, 1, 3, 2, 4, 6, 2, 4, 6, 6, 2, 5, 5, 6, 5, 1, 6, 6, 4, 5, 6, 1, 4, 2, 6, 1, 3, 1, 1, 4, 2, 3, 5, 5, 1, 4, 4, 5, 3, 2, 3, 6, 6, 2, 5, 2, 4, 6, 1, 1, 5, 4, 3, 4, 1, 1, 6, 4, 4, 1, 3, 5, 5, 4, 5, 1, 1, 4, 4, 6, 4, 3, 5, 4, 2, 6, 2, 1, 5, 4, 2, 5, 1, 3, 6, 5, 5, 3, 5, 1, 1, 3, 6, 4, 2, 4, 5, 2, 3, 3, 6, 2, 1, 2, 5, 1, 3, 2, 4, 6, 4, 6, 5, 4, 2, 2, 4, 2, 5, 1, 5, 6, 5, 6, 2, 1, 2, 3, 2, 6, 2, 2, 1, 2, 1, 4, 3, 1, 6, 4, 1, 1, 3, 6, 5, 5, 1, 2, 6, 4, 2, 2, 6, 1, 1, 1, 1, 5, 1, 5, 5, 1, 3, 4, 2, 5, 6, 6, 4, 6, 3, 6, 2, 2, 5, 1, 3, 5, 3, 1, 6, 6, 1, 5, 1, 4, 2, 5, 3, 4, 5, 1, 1, 1, 1, 3, 4, 6, 2, 3, 3, 6, 6, 2, 2, 6, 1, 3, 5, 2, 2, 6, 4, 5, 5, 2, 1, 4, 5, 2, 5, 4, 4, 3, 6, 6, 2, 4, 3, 3, 5, 5, 3, 5, 4, 1, 4, 3, 3, 4, 5, 5, 6, 3, 2, 6, 5, 4, 5, 4, 6, 3, 5, 4, 3, 2, 4, 6, 2, 2, 1, 5, 4, 2, 1, 6, 3, 4, 2, 5, 1, 2, 5, 2, 4, 4, 4, 6, 6, 1, 4, 5, 2, 3, 5, 6, 6, 5, 6, 4, 1, 2, 1, 2, 2, 1, 5, 2, 1, 2, 3, 5, 4, 2, 3, 4, 4, 2, 1, 2, 3, 4, 2, 1, 2, 5, 1, 3, 4, 2, 1, 5, 1, 6, 5, 3, 4, 3, 2, 1, 6, 5, 5, 1, 6, 1, 2, 3, 5, 2, 3, 2, 6, 5, 1, 1, 3, 4, 6, 3, 4, 2, 6, 2, 5, 6, 4, 5, 1, 4, 3, 1, 1, 3, 6, 1, 4, 5, 1, 4, 2, 4, 5, 4, 3, 5, 6, 2, 3, 6, 4, 5, 2, 3, 6, 6, 2, 4, 2, 6, 1, 3, 2, 6, 4, 6, 4, 2, 4, 5, 5, 5, 1, 2, 6, 6, 1, 4, 1, 4, 4, 3, 6, 5, 4, 3, 6, 5, 4, 4, 1, 1, 6, 5, 4, 6, 6, 2, 1, 5, 4, 6, 4, 2, 5, 6, 4, 1, 2, 5, 2, 1, 5, 2, 3, 1, 1, 1, 3, 3, 4, 6]



- 3) [25, 10, 13, 3, 9, 14, 7, 8, 11, 17, 12, 9, 18, 6, 11, 15, 13, 7, 10, 9, 10, 4, 8, 18, 11, 14, 9, 20, 14, 8, 7, 8, 8, 13, 17, 6, 22, 14, 8, 13, 4, 8, 10, 7, 7, 5, 17, 11, 9, 9, 11, 11, 12, 12, 11, 4, 19, 25, 9, 9, 17, 8, 6, 9, 11, 17, 10, 7, 3, 8, 12, 13, 11, 15, 14, 4, 7, 1, 14, 7, 9, 4, 5, 6, 13, 6, 2, 15, 13, 3, 5, 14, 4, 4, 13, 16, 10, 4, 4, 17, 16, 14, 17, 21, 12, 10, 20, 7, 12, 12, 6, 5, 12, 10, 19, 15, 11, 4, 3, 13, 9, 11, 7, 9, 10, 13, 5, 10, 8, 4, 9, 15, 8, 3, 24, 7, 14, 17, 11, 2, 8, 17, 14, 11, 18, 4, 13, 7, 10, 6, 3, 15, 5, 9, 23, 2, 16, 11, 10, 13, 10, 5, 23, 8, 3, 15, 10, 6, 8, 8, 11, 9, 6, 5, 12, 8, 8, 7, 9, 6, 8, 8, 8, 14, 21, 6, 9, 6, 13, 9, 3, 14, 5, 8, 9, 13, 9, 4, 23, 12, 8, 9, 5, 5, 12, 14, 12, 6, 9, 12, 9, 3, 12, 8, 11, 4, 15, 12, 10, 12, 12, 6, 21, 10, 4, 6, 6, 11, 8, 7, 10, 6, 7, 9, 4, 14, 10, 12, 8, 9, 10, 8, 7, 8, 11, 6, 5, 6, 7, 18, 10, 10, 11, 10, 4, 11, 8, 21, 10, 15, 8, 7, 12, 5, 7, 30, 11, 7, 11, 13, 10, 9, 9, 4, 10, 10, 18, 14, 12, 19, 8, 10, 6, 2, 4, 17, 1, 12, 6, 14, 7, 11, 13, 2, 2, 6, 8, 13, 21, 11, 16, 12, 4, 10, 3, 11, 7, 10, 8, 11, 7, 16, 6, 13, 4, 10, 8, 10, 6, 12, 14, 10, 10, 12, 10, 10, 5, 9, 10, 5, 17, 2, 7, 16, 18, 9, 11, 11, 6, 7, 14, 3, 6, 4, 7, 9, 12, 9, 14, 7, 11, 9, 7, 10, 7, 8, 19, 10, 6, 11, 10, 17, 21, 14, 6, 9, 5, 11, 11, 10, 13, 11, 4, 9, 9, 11, 3, 8, 9, 7, 10, 8, 2, 5, 5, 4, 8, 15, 6, 6, 10, 11, 8, 17, 16, 4, 3, 9, 9, 17, 10, 14, 19, 7, 7, 23, 9, 9, 10, 5, 13, 4, 12, 12, 3, 12, 11, 4, 16, 11, 5, 16, 7, 12, 6, 3, 12, 8, 12, 13, 4, 13, 21, 6, 19, 8, 8, 2, 12, 17, 11, 13, 10, 11, 8, 6, 4, 12, 4, 11, 6, 5, 12, 7, 19, 5, 14, 24, 11, 17, 10, 7, 7, 11, 14, 7, 5, 16, 4, 7, 9, 5, 7, 8, 11, 10, 16, 8, 10, 4, 11, 7, 7, 18, 10, 7, 14, 19, 3, 10, 16, 9, 7, 6, 9, 10, 16, 9, 8, 11, 12, 6, 18, 5, 7, 7, 10, 6, 13, 8, 10, 12, 11, 15, 10, 6, 6, 7, 11, 6, 10, 10, 7, 20, 16, 10, 13, 8, 12, 7, 14, 10, 10, 11, 5, 8, 15, 8, 12, 4, 4, 10, 20, 5, 7, 12, 8, 18, 20, 11, 6, 10, 9, 6, 13, 10, 4, 7, 9, 12, 17, 11, 12, 14, 11, 9, 15, 22, 16, 4, 10, 9, 17, 11, 16, 11, 19, 7, 10, 16, 21, 12, 5, 11, 13, 8, 20, 12, 5, 21, 2, 4, 12, 12, 5, 19, 6, 9, 8, 7, 10, 5, 8, 7, 8, 2, 7, 14, 10, 13, 17, 8, 9, 4, 11, 10, 12, 8, 10, 12, 5, 10, 12, 8, 8, 10, 9, 12, 12, 10, 3, 9, 10, 11, 6, 7, 4, 9, 8, 9, 4, 6, 8, 8, 11, 5, 9, 13, 8, 4, 16, 6, 15, 10, 6, 10, 10, 12, 20, 11, 5, 11, 9, 16, 3, 18, 10, 6, 13, 7, 13, 13, 18, 10, 10, 14, 19, 11, 8, 8, 11, 9, 18, 9, 2, 9, 7, 2, 11, 6, 3, 9, 6, 13, 11, 9, 4, 7, 9, 13, 9, 6, 9, 10, 6, 9, 6, 9, 14, 8, 11, 10, 10, 14, 12, 12, 6, 5, 18, 6, 12, 15, 5, 4, 20, 8, 7, 17, 15, 4, 8, 8, 13, 10, 13, 19, 12, 10, 10, 12, 12, 15, 3, 5, 7, 6, 9, 8, 6, 17, 8, 8, 5, 11, 9, 7, 5, 9, 3, 19, 19, 11, 10, 12, 16, 4, 7, 8, 10, 12, 10, 5, 3, 12, 9, 9, 19, 17, 14, 8, 9, 5, 12, 12, 8, 10, 11, 14, 5, 1, 9, 13, 9, 10, 2, 8, 9, 6, 6, 8, 11, 13, 9, 10, 23, 7, 4, 18, 7, 7, 6, 8, 7, 10, 18, 10, 8, 6, 9, 11, 10, 14, 4, 11, 7, 5, 6, 12, 16, 7, 8, 8, 5, 7, 8, 6, 9, 12, 6, 14, 13, 10, 18, 16, 5, 14, 14, 9, 12, 11, 10, 4, 7, 19, 15, 9, 14, 16, 6, 6, 13, 25, 4, 8, 18, 8, 14, 16, 10, 10, 8, 9, 3, 11, 6, 13, 10, 9, 15, 10, 10, 10, 10, 11, 26, 8, 8, 16, 2, 9, 6, 6, 15, 7, 7, 12, 12, 11, 17, 10, 20, 7, 9, 10, 18, 11, 1, 6, 5, 12, 6, 14, 15, 2, 8, 12, 7, 19, 12, 4, 19, 15, 8, 14, 9, 8, 4, 4, 11, 24, 18, 7, 8, 9, 20, 8, 10, 6, 7, 2, 16, 14, 8, 10, 10, 11, 10, 12, 12, 8, 28, 8, 17, 11, 3, 12, 7, 10, 9, 4, 6, 11, 8, 14, 5, 6, 12, 9, 12, 14, 6, 17, 8, 10, 13, 9, 16, 4, 3, 5, 9, 6, 12, 14, 7, 5, 9, 10, 12, 6, 12, 9, 3, 9, 7, 2, 13, 11, 13, 13]
- 4) [17, 16, 14, 17, 13, 15, 15, 15, 17, 13, 15, 15, 16, 17, 14, 17, 13, 15, 15, 14, 12, 19, 16, 15, 10, 15, 12, 15, 18, 15, 18, 15, 15, 14, 14, 14, 16, 11, 15, 17, 14, 19, 18, 16, 14, 18, 19, 14, 17, 15, 15, 15, 17, 18, 13, 15, 14, 15, 18, 17, 13, 18, 17, 13, 14, 16, 17, 14, 16, 16, 18, 14, 15, 16, 16, 16, 13, 17, 17, 11, 14, 17, 16, 17, 15, 15, 16, 17, 12, 16, 14, 15, 16, 17, 15, 15, 11, 14, 16, 16, 15, 19, 16, 14, 15, 16, 16, 15, 16, 17, 16, 18, 17, 16, 14, 16, 17, 15, 17, 14, 18, 18, 17, 16, 13, 17, 18, 14, 16, 14, 17, 16, 15, 16, 17, 18, 17, 17, 15, 14, 16, 16, 15, 13, 16, 17, 13, 16, 12, 16, 16, 15,



18, 17, 17, 18, 15, 17, 13, 16, 15, 14, 16, 10, 16, 15, 16, 15, 14, 14, 15, 15, 14, 15, 14, 14, 19, 15, 17, 17, 14, 16, 16, 15, 17, 14, 12, 14, 16, 18, 10, 15, 19, 17, 15, 13, 17, 16, 17, 12, 17, 17, 15, 16, 16, 15, 17, 13, 16, 15, 15, 14, 14, 16, 13, 18, 14, 16, 16, 11, 14, 16, 16, 15, 15, 16, 15, 17, 15, 17, 17, 15, 18, 15, 17, 18, 13, 15, 18, 13, 15, 15, 15, 14, 18, 13, 17, 13, 15, 15, 15, 16, 18, 15, 12, 17, 17, 15, 16, 17, 12, 15, 17, 17, 16, 16, 12, 15, 15, 15, 15, 14, 14, 11, 13, 17, 15, 16, 15, 14, 18, 12, 17, 15, 16, 16, 17, 19, 17, 17, 15, 14, 15, 17, 15, 15, 18, 13, 16, 16, 16, 13, 16, 13, 15, 15, 16, 15, 16, 17, 16, 15, 14, 14, 17, 17, 16, 15, 15, 16, 16, 17, 16, 17, 15, 17, 16, 13, 16, 18, 14, 18, 13, 13, 13, 15, 17, 13, 17, 13, 16, 15, 15, 16, 19, 15, 15, 15, 16, 15, 14, 18, 17, 16, 14, 16, 15, 15, 16, 13, 17, 14, 13, 16, 15, 15, 18, 16, 14, 16, 15, 14, 17, 16, 15, 13, 17, 13, 15, 16, 17, 14, 16, 17, 13, 18, 17, 16, 16, 14, 18, 14, 15, 14, 15, 15, 15, 13, 13, 16, 17, 14, 17, 17, 14, 16, 16, 16, 15, 11, 15, 17, 17, 17, 14, 16, 18, 16, 17, 16, 18, 14, 14, 19, 16, 13, 17, 14, 17, 18, 18, 15, 16, 15, 16, 17, 14, 16, 14, 17, 15, 16, 16, 12, 16, 16, 16, 13, 14, 16, 16, 15, 17, 14, 15, 17, 16, 15, 14, 16, 18, 17, 16, 15, 17, 15, 16, 13, 16, 15, 15, 16, 13, 16, 13, 17, 16, 16, 17, 14, 16, 15, 18, 17, 15, 16, 13, 15, 16, 13, 17, 16, 15, 14, 14, 12, 15, 14, 17, 15, 16, 14, 15, 18, 16, 17, 20, 16, 17, 14, 14, 18, 18, 12, 12, 12, 17, 15, 16, 17, 15, 16, 13, 17, 14, 15, 18, 16, 13, 14, 18, 17, 16, 13, 14, 18, 16, 12, 14, 16, 17, 18, 15, 16, 17, 16, 13, 14, 17, 16, 17, 13, 17, 15, 14, 15, 17, 14, 16, 14, 15, 15, 14, 15, 14, 16, 19, 19, 15, 17, 16, 15, 13, 16, 13, 18, 13, 15, 18, 16, 14, 17, 15, 16, 14, 16, 18, 19, 16, 15, 18, 16, 14, 16, 15, 17, 18, 15, 16, 16, 18, 14, 14, 19, 16, 14, 17, 18, 14, 16, 16, 16, 13, 15, 15, 17, 17, 15, 15, 18, 16, 16, 17, 18, 14, 15, 16, 13, 14, 16, 16, 16, 12, 14, 14, 15, 15, 19, 17, 15, 18, 16, 18, 13, 14, 16, 16, 17, 15, 17, 14, 16, 17, 14, 17, 14, 16, 14, 16, 15, 16, 17, 15, 16, 17, 13, 12, 15, 15, 16, 14, 16, 15, 17, 14, 15, 15, 15, 13, 16, 16, 17, 15, 16, 17, 12, 17, 16, 16, 15, 20, 15, 14, 16, 14, 18, 17, 18, 13, 17, 15, 17, 16, 13, 13, 18, 18, 14, 16, 16, 16, 18, 14, 15, 18, 16, 16, 16, 18, 17, 15, 18, 13, 16, 16, 16, 15, 13, 15, 17, 15, 17, 16, 17, 19, 15, 14, 18, 16, 18, 14, 17, 17, 15, 14, 12, 15, 16, 14, 16, 17, 12, 13, 14, 19, 14, 18, 13, 15, 15, 15, 17, 12, 18, 16, 10, 14, 15, 16, 16, 15, 16, 16, 16, 13, 19, 15, 12, 19, 14, 13, 17, 14, 13, 14, 16, 16, 19, 13, 14, 14, 17, 14, 12, 12, 17, 14, 18, 17, 16, 14, 13, 15, 17, 14, 17, 15, 18, 14, 17, 19, 16, 14, 15, 18, 18, 19, 12, 14, 15, 17, 15, 18, 16, 15, 13, 17, 15, 16, 14, 18, 15, 14, 15, 14, 12, 16, 13, 16, 15, 17, 15, 17, 15, 15, 18, 16, 13, 14, 16, 14, 18, 14, 15, 18, 15, 16, 15, 13, 15, 14, 15, 17, 15, 17, 14, 13, 18, 18, 17, 13, 17, 13, 17, 16, 15, 15, 15, 16, 14, 17, 15, 15, 13, 15, 17, 16, 14, 14, 14, 15, 16, 17, 16, 14, 15, 15, 12, 14, 15, 15, 14, 16, 18, 16, 19, 15, 15, 18, 15, 15, 12, 14, 17, 17, 16, 16, 15, 14, 15, 18, 14, 16, 12, 11, 16, 16, 13, 16, 11, 13, 8, 13, 17, 20, 13, 16, 18, 13, 12, 14, 16, 16, 18, 16, 14, 13, 16, 14, 17, 16, 19, 18, 19, 18, 13, 14, 15, 16, 12, 16, 15, 16, 16, 17, 13, 16, 17, 13, 16, 18, 15, 16, 15, 16, 17, 17, 14, 16, 17, 15, 14, 16, 17, 16, 15, 16, 18, 16, 14, 12, 18, 15, 12, 16, 13, 15, 17]

Consituas:

1) [0.4967141530112327, -0.13826430117118466, 0.6476885381006925, 1.5230298564080254, -0.23415337472333597, -0.23413695694918055, 1.5792128155073915, 0.7674347291529088, -0.4694743859349521, 0.5425600435859647, -0.46341769281246226, -0.46572975357025687,



0.24196227156603412, -1.913280244657798, -1.7249178325130328, -0.5622875292409727, -1.0128311203344238, 0.3142473325952739, -0.9080240755212109, -1.4123037013352915, 1.465648768921554, -0.22577630048653566, 0.06752820468792384, -1.4247481862134568, -0.5443827245251827, 0.11092258970986608, -1.1509935774223028, 0.37569801834567196, -0.600638689918805, -0.2916937497932768, -0.6017066122293969, 1.8522781845089378, -0.013497224737933921,-1.0577109289559004, 0.822544912103189, -1.2208436499710222, 0.2088635950047554, -1.9596701238797756, -1.3281860488984305, 0.19686123586912352, 0.7384665799954104, 0.1713682811899705, -0.11564828238824053, -0.3011036955892888, -1.4785219903674274, -0.7198442083947086, -0.4606387709597875, 1.0571222262189157, 0.3436182895684614, -1.763040155362734, 0.324083969394795, -0.38508228041631654, -0.6769220003059587, 0.6116762888408679, 1.030999522495951, 0.9312801191161986, -0.8392175232226385, -0.3092123758512146, 0.33126343140356396, 0.9755451271223592, -0.47917423784528995, -0.18565897666381712, -1.1063349740060282, -1.1962066240806708, 0.812525822394198, 1.356240028570823, -0.07201012158033385, 1.0035328978920242, 0.36163602504763415, -0.6451197546051243, 0.36139560550841393, 1.5380365664659692, -0.03582603910995154, 1.5646436558140062, -2.6197451040897444, 0.8219025043752238, 0.08704706823817122, -0.29900735046586746, 0.0917607765355023. -1.9875689146008928. -0.21967188783751193. 0.3571125715117464, 1.477894044741516, -0.5182702182736474, -0.8084936028931876, -0.5017570435845365, 0.9154021177020741, 0.32875110965968446, -0.5297602037670388, 0.5132674331133561, 0.09707754934804039, 0.9686449905328892, -0.7020530938773524, -0.3276621465977682, -0.39210815313215763, -1.4635149481321186, 0.29612027706457605, 0.26105527217988933, 0.00511345664246089, -0.23458713337514692]

2) [0.2428355674016738, 0.6566229493256713, 0.7098408304623798, 0.44830688531286167, 0.8510488817739239, 1.4978801224326888, 6.594169840950424, 1.1907433938957022, 1.2937570026882204, 0.9282576768066321, 0.1467872212496126, 0.9738345313502039, 1.0620810200131512, 11.7428214385014, 0.8250090155389854, 1.3519491180492442, 0.965883773104824, 0.3107775060017556, 3.135607121528218, 2.1210962045998336, 2.2056713883009627, 0.40277086384837535, 4.066547303069456, 0.24614091969045432, 1.798327549467945, 8.939285156004578, 0.37137745853614273, 0.567623047351363, 1.1047856840663974, 0.6044262281851434, 0.21210720862634921, 1.0709680668336576, 0.3456585939560384, 1.6057523981563642, 0.39874856077399756, 4.7111611439225545, 0.4569171057774341, 0.724653611018163, 2.255828288238694, 0.292040053548546, 1.2554071403624454, 3.6955993771731013, 0.20039131790020046, 1.202777972603702, 1.2967780879079602,



2.185452436292338, 0.29026798082636535, 0.2670133523357179, 1.6852965891535334, 1.3457946726089, 1.2846584050299192, 1.4140362582848147, 0.5066044681486579, 1.2614397119109022,1.3405399402627394, 0.4895094958953625, 6.460938017137868, 1.6061386124332853, 0.3038249708396753, 1.9281357599744173, 0.3773124442325264, 2.1969820073906106, 3.185456411295541, 0.4401312424054552, 2.6205287994119475, 1.5110139672135023, 2.2751822520706257, 6.664487008183124, 0.7824008170284014, 0.4706050064253799, 0.4108552034397441, 0.44228080864005914, 0.9257956866808726, 1.4065669873797182, 1.318758546962206, 2.2868681216499187, 1.0130867839945006, 4.278207344699202, 0.7674692747370984, 15.182890465519822, 1.869493143303462, 0.42436660775030366, 0.3427025195535281, 1.6200749526520724,0.7997446535504913, 2.0421445263362386, 1.6051827685320081, 0.9297598865678633, 0.42878754403709807, 0.2198417686775761, 0.6398541929709507, 2.354665771163376, 1.2387387738395312, 0.28772826207639357, 1.1890812211554782, 1.4700808212608552, 0.41318599504462367, 1.1661702694389875, 1.0599362008613897, 0.3188704735025042]

3) [1.0493043189503972, 0.675017124176835, 0.5970372126508365, 0.606143778112245, 0.22274617115747455, 0.1737810421335476, 0.8286872536298562. 0.8306640995435144. 1.0089750236839574. 1.2223079809183182, 0.35804661846645186, 0.3480921887755996. 0.8004749661542437, 0.5248595374439001, 0.6052753242557585, 0.7943097374771024, 1.1036617381733835, 0.2062412035688271, 0.23546839436377817, 0.04934801959368028, 0.43170701330471734,0.0183020521054285, 0.3133034740910548, 0.391147292843563, 0.16881533015726125, 0.44681626507308764, 0.015487531050737273,0.01903174964139469, 0.864675684769068, 0.22329251210387235, 0.067944520648714, 0.3693267941395078, 0.7348239702228676, 0.12155900171495168, 0.48760980932824644, 0.04460551449494864, 0.026532547955154702, 0.37895447031276047, 0.3889552213473711, 0.5072687241023079, 0.6474802814583421, 1.8617785043499964, 0.36314555961517814, 0.1950098570529894, 0.7928269898663431, 0.15792573271806865, 0.28899171563665066, 0.04085258429183495, 0.01283880477073719, 1.643689961634301, 0.9038838210575313, 0.5953213663996708, 0.26292982223257094, 0.09515326807105437, 0.08506037078642707, 0.1440029945632918, 0.3983953241566573, 0.6269246438883879, 0.5396951748483992, 0.16420613069449796, 1.5490517492781533, 0.6695087024376132, 0.40411524096566565, 0.47301523601871753, 0.2720189327660257, 0.14233064613703175, 0.2200070646615562, 0.7090909238783566, 0.007249039860402138, 0.06169019611998802, 0.023547188476260264, 0.020790725958646214, 0.9671015168078293, 0.6081203058503442, 0.3213922972064462, 0.05147845922390663, 0.3382589828986166, 0.3207251660471856,



 $\begin{array}{c} 0.09509735640011249,\ 0.2844495656511619,\ 0.25416830729160345,\\ 0.47836121645656726,\ 0.504057268020456,\ 0.023181162010267365,\\ 0.23469200232753076,\ 0.49156249739136426,\ 0.34971972630389486,\\ 0.9706747265877194,\ 0.5374873820274989,\ 0.08892643438365366,\\ 0.03659121812812042,\ 0.5141970735544455,\ 0.013434536333697214,\\ 0.44067368890364533,\ 1.408627727693576,\ 0.42839122278877223,\\ 0.24565034611195363,\ 0.515413578922491,\ 0.30647798702554563,\\ 0.3944071802881601] \end{array}$