Name: _____

Neptun: _____

Methods and Tools
Homework

1. **Calculate the derivative of the following function.**

$$f = \frac{e^{3x}}{1 + e^{x}}$$

2. **Consider the *Laplace* distribution with parameter $\lambda > 0$, centered at μ:**

$$\mathcal{L}(x|\mu, \lambda) = \frac{1}{\lambda\sqrt{2}} e^{(-\frac{\sqrt{2}|x-\mu|}{\lambda})}.$$

   Show that this distribution is normalized.

3. **Calculate the Eigen values of the A matrix. If $\lambda = 2$ is an Eigen value give a concrete example of the corresponding Eigen vectors.**

$$\mathbf{A}= \begin{bmatrix} 1 & 2 & 1 \\ -1 & 4 & 1 \\ 2 & -4 & 0 \end{bmatrix}$$

4. **Compute the covariance of the joint variables X, Y based on the following observations:**

   $X = [98, 87, 90, 85, 95, 75]$

   $Y = [15, 12, 10, 10, 16, 7]$