

- A. A student who is ready for 651-654 should be able to do the following problems:

1. Graph the function  $f(x) = \frac{1}{5\sqrt{2\pi}} e^{\frac{1}{2}(\frac{x-3}{5})^2}$

2. Consider the function  $\sum_{i=1}^N [y_i - (\beta_0 + \beta_1 x_i)]^2$ . Find the values of  $\beta_0$  and  $\beta_1$  in terms of the  $y$ 's and the  $x$ 's that minimize the function. Do this by setting first derivatives equal to 0.

3. Find  $\int_0^\infty \lambda e^{-\lambda t} dt$

4. Show  $\sum_{i=1}^N (x_i - \bar{x})^2 = \sum_{i=1}^N (x_i^2) - N\bar{x}^2$  where  $\bar{x} = \sum_{i=1}^N x_i / N$ .

5. If the matrix  $A = \begin{pmatrix} 3 & 2 & 6 \\ 9 & 1 & 4 \end{pmatrix}$  and  $B = \begin{pmatrix} 6 & 4 \\ 4 & 2 \\ 5 & 1 \end{pmatrix}$ , find the product of  $A \cdot B$ .