Class Test-03

1. Complains come to a police station according to a Poisson process on the average of $\mathbf{5}$ in every hour. Let $\boldsymbol{X}$ denote the waiting time in minutes until the first complain comes at a certain office hour. Find $\boldsymbol{P}(\boldsymbol{X} \geq \mathbf{10})$. Also, find the ***median*** of $\boldsymbol{X}$. **[3]**

2. If the *mgf* of a Gamma distribution of a random variable $\boldsymbol{X}$ is $\boldsymbol{M}(\boldsymbol{t}) = (\mathbf{1} - \mathbf{5}\boldsymbol{t})^{-\mathbf{3}}$, find the mean and variance of $\boldsymbol{X}$. Also, find $\boldsymbol{P}(\boldsymbol{X} > \mathbf{4})$. **[3]**

3. If $\boldsymbol{X}$ is a random variable satisfying $\boldsymbol{N}(\mathbf{650}, \mathbf{625})$, find $\boldsymbol{P}(\mathbf{631} \leq \boldsymbol{X} \leq \mathbf{676})$. Also, find a constant $\boldsymbol{c} > \mathbf{0}$ such that $\boldsymbol{P}(|\boldsymbol{X} - \mathbf{650}| \leq \boldsymbol{c}) = \mathbf{0.6826}$. **[4]**