ENGG 2470A **Assignment 4** **Spring 21**

1. The pdf of the Gaussian distribution $\mathcal{N}(0, 1)$ is given by

$$\frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}.$$

   Show that $\int_{-\infty}^{\infty} f(x)dx = 1$. Hint: Use the polar coordinates.

2. Show that the expectation of the exponential distribution with parameter λ is $1/\lambda$.

3. The pmf of a geometric distribution with parameter p is given by

$$p_n = \begin{cases} p(1-p)^n & n = 0, 1, 2, \ldots \\ 0 & \text{otherwise.} \end{cases}$$

   Show that the expectation is $(1 - p)/p$.

Textbook Problems 3.6.1, 3.6.7, 3.7.6, 3.8.5, 4.2.2, 4.3.2, 4.3.4, 6.2.3, 6.2.5.

Notes

1. In Problem 6.2.3, *Tour de France* is the world's most prestigious bicyle race.

2. In Problem 6.2.5, in addition to using the method described in Section 3.4 in the lecture notes, also obtain $f_W(w)$ by differentiating $F_W(w)$.