Math 473 HW 1 Spring 2023. Due Friday, Jan. 27.

Place your solutions on a separate sheet of paper. DO NOT place solutions side by side. You may use both the front and the back of each sheet. For the HW1 handout see the course webpage (http://parker.ad.siu.edu/Olive/M473.html).

YOU ARE BEING GRADED FOR WORK NOT JUST THE FINAL ANSWER. As a rule of thumb, you should have some idea of what you were doing, even without the book or notes. You are encouraged to form groups to discuss ideas and HW problems, but do not copy.

1) Suppose $H(t) = \frac{\lambda}{\theta}[e^{\theta t} - 1]$ for $t > 0$ where $\lambda > 0$ and $\theta > 0$. Find $a)h(t)$, $b)S(t)$, c) $F(t)$ and d) $f(t)$ for $t > 0$.

2) Suppose $T \sim \text{EXP}(\lambda)$. Show $P(T > t + s|T > s) = P(T > t)$ for any $t > 0$ and $s > 0$. This property is known as the memoryless property and implies that the future survival of the product does not depend on the past if the lifetime T of the product is exponential.

3) Suppose $F(t) = 1 - \exp[-at - (bt)^2]$ where $a > 0$, $b > 0$ and $t > 0$. Find $a)S(t)$, $b)f(t)$, c) $h(t)$ and d) $H(t)$ for $t > 0$.

4) Referring to the handout on survival functions of US population by race and sex, consider Figure 2.2. Graphically, at what age have about 50% of black males died? (See the HW1 handout.)

5) Figure 2.1 in Collett is a graph of the estimated survival function for patients being treated for pulmonary metastasis arising from osteosarcoma (a malignant bone tumour that has spread to the lungs). Graphically, after how many months have about 50% of the patients died? (See the HW1 handout.)