Be sure to write your name and section number on the first page. Organize your work so that the answers are given in order. If you require more than one page, please staple your pages together. Show all work (within reason) to receive full credit.

1. You need to understand some mathematical operators to do well in this course. Use your calculator to compute the following.

   (a) $\frac{t^n e^{-t}}{n!}$ with $t = 2$ and $n = 5$.

   (b) $\sum_{k=0}^{4} \frac{3^k}{k!}$.

   (c) $\int_{0}^{4} (x^2 + 2)dx$.

2. Briefly explain the following rules from calculus. You may use a text-book, search engine, or ask a classmate if needed - you are not expected to know these from memory.

   (a) The Chain Rule.

   (b) Integration by Parts.

   (c) "U substitution".

3. Solve for the constant c.

   (a) $7.5 = 2^{2c} \cdot 4^{3c}$.

   (b) $\int_{0}^{3} (x + 1)dx = c$.

   (c) $\int_{0}^{1.5} cxe^x dx = 1$. [Hint: Use integration by parts.]

4. Draw a labeled sketch of the following functions.

   (a) $f(x) = e^{-x}$.

   (b) $f(x) = x^2 - 2x + 1$.

(c) $f(x) = \begin{cases} 2 & \text{if } 0 < x < 0.5 \\ 0 & \text{otherwise.} \end{cases}$

5. A statistician needs to be in his office by 8:00 am each morning. Let E be the event that he arrives at work before 7:45. Let F be the event that he has at least two cups of coffee before 11. Let G be the event that he has a meeting scheduled before noon. Describe the following events in words.

   (a) F occurs.

   (b) E and F occur.

   (c) at least one of the three events occurs.

   (d) E and G occur, but not F.

6. Let $\Omega = \{1, 2, ..., 10\}$. Let A={1,2,3,4,5}, B={2,4,6,8}, and C={1,3,5,7}. Describe the elements of the following sets.

   (a) $(A \cup B)$.

   (b) $(A \cap B)$.

   (c) $(A^c \cap B^c)$.

   (d) $(A \cap B)^c$.

   (e) $(A \cup B) \cap C$.

   (f) $(A \cap B) \cup (A \cap C)$.

7. A bag contains six yellow marbles, seven green marbles, and one red marble. Suppose we randomly draw one marble from the bag. Compute the following probabilities.

   (a) What is the probability that we will get a green marble on the first draw?

   (b) What is the probability that we do not draw the red marble?

   (c) Suppose someone reaches in and removes three yellow marbles. If we then draw one marble from the bag, what is the probability that we draw one yellow marble?