# Problem Set 4

NAME

DATE

Due at close of business Day 10.

1. Integrals: Foundations
   (a) What is an integral (e.g. what does it do?)
   (b) Why would we use an integral?
   (c) Calculate the area under $x^3$ on $[1, 4]$ using rectangles.
   (d) (Follow up) Now, calculate the area a second time using smaller rectangles.
   (e) (Follow up) How do these areas compare? How does your finding here relate to the definition of an integral (above)?
2. Integration Practice: Calculate the definite integrals for the following
   (a) $\int_1^4 x^3 dx$
   (b) $\int_0^3 x dx$
   (c) $\int_1^4 (6x^3 - 2) dx$
   (d) $\int_4^6 x dx$
   (e) $\int_0^y (e^x - 2x^2) dx$
3. Iterated Integration Practice: Calculate the following
   (a) $\int_1^4 \int_0^2 (6x^3 - 2y)\ dx\ dy$
   (b) $\int_0^1 \int_1^x 3x - 4\ dy\ dx$
   (c) $\int_0^1 \int_1^y 3x - 4\ dx\ dy$
4. Probability and Statistics
   (a) Provide one example of an event or set of events that fulfill the following conditions and one that does not:
      - Independence

- Mutual Exclusivity
- Collective Exhaustion

(b) Provide an example of a discrete random variable. Create an example histogram of the distribution of this random variable with fake data.

(c) Provide an example of a continuous random variable.

5. Topics and Questions

(a) List three things you struggled with on today's assignment.

(b) What is your plan for improving the items listed above?

(c) What percent of the material was new to you today?

(d) What is one new concept you learned today?

(e) What question do you still have about the material?