Complete the following tasks. You need to show work for full credit. In particular, for integrals, you may use resources like *Wolfram Alpha* to check your answers, but you need to show your work during Math 32 homework and exams. Some answers have been provided.

Assemble your work into one PDF document and upload the PDF back into our CatCourses page.

1. **FizzBuzz and the Law of De Morgan** In this setting, the universal set is the set of natural numbers from 1 to 32

$$\{1, 2, 3, 4, ..., 32\}$$

   Let $T$ be the subset of numbers that are divisible by 3 and let $F$ be the subset of numbers that are divisible by 5.

   (a) Write out lists of the elements of each of the following sets: $F$, $T$, $F^c$, $T^c$

   (b) We will do a "proof by example" of De Morgan's Law

      i. Write out lists of the elements of $(F \cup T)^c$

      ii. Write out lists of the elements of $F^c \cap T^c$

      iii. Make an observation about the previous two calculations.

2. If you roll a pair of fair standard six–sided dice, what is the probability that

   (a) the sum is 7;

   (b) the largest number is at least 5:

   (c) both numbers are at least 5?

3. An academic department with five faculty members—Anderson, Box, Cox, Cramer, and Fisher—must select two of its members to serve on a personnel review committee. Because the work will be time–consuming, no one is anxious to serve, so it is decided that the representatives will be selected by putting five slips of paper in a box, mixing them, and selecting two.

   (a) What is the probability that both Anderson and Box will be selected?

   (b) What is the probability that at least one of the two members whose name begins with C is selected?

   (c) If the five faculty members have taught for 3, 6, 7, 10, and 14 years, respectively, at the university, what is the probability that the two chosen representatives have a combined 15 years' teaching experience or more at the university?

4. **FizzBuzz and the Conditional Probabilities** In this setting, the universal set is the set of natural numbers from 1 to 32

$$\{1, 2, 3, 4, ..., 32\}$$

Let $T$ be the subset of numbers that are divisible by 3 and let $F$ be the subset of numbers that are divisible by 5.

(a) Write out the elements of each of the following sets: $F$, $T$, $F \cap T$, $F \cup T$

(b) Compute $P(F \cup T)$

(c) Compute $P(F \cap T)$

(d) Compute $P(F|T)$

(e) Compute $P(T|F)$

(f) Does $P(F|T) = P(T|F)$?

Some answers

1.

2. (a) 6/36
   (b) 20/36
   (c) 4/36

3.
   (a)
   (b) 14/20
   (c)

4. (a)
   (b)
   (c)
   (d) 2/10
   (e) 2/6
   (f) No