1. (15 points) In a carton of 12 eggs, 2 have gone bad. If 4 eggs are selected at random to make an omelette, what is the probability that the omelette will be edible?

2. (10 points) True or false?
   (a) The pdf (density) function \( f_Y \) of a continuous random variable \( Y \) is always continuous.

   (b) The cdf function \( F_X \) of a discrete random variable \( X \) is always continuous from the right.
3. (20 points) 20 people each choose (independently) their favorite letter. Assume that all 26 letters of the alphabet have equal chance of being chosen. What is the probability that
(a) at least two have chosen the same letter?

(b) only vowels have been selected? (there are five vowels: A,E,I,O,U)

(c) letter A was selected exactly 3 times?

(d) the highest (alphabetically) selected letter is J (the 10th letter in the alphabet)?
4. (*15 points*) In a 5 card poker hand (using a standard deck of 4 suits of 13 cards each), *a royal flush* consists of the cards A,K,Q,J,10, all of the same suit. If you were to play one million poker games, what is the probability that you would be dealt a royal flush at least twice.

5. (*10 points*) Graph the cdf function \( F_X \) if \( X \) assumes values \(-2, 1/2, \) and 3 with probabilities, resp., 0.1, 4/5, and \( \frac{1}{10} \).
6. (10 points) In how many ways can the letters of the word ABRACADABRA be arranged so that 
(a) all A’s stay together? 

(b) no two A’s are next to each other?
7. (10 points) Given $F_Y$ below, find and graph $f_Y$. Then compute $P(Y > 1)$ (by any means).

$$F_Y(y) =\begin{cases} 
0, & y < 0 \\
\frac{3}{2}y^2 - y^3 & 0 \leq y < 1 \\
\frac{1}{2} & 1 \leq y < 2 \\
\frac{1}{2}(y - 1) & 2 \leq y < 3 \\
1 & y > 3
\end{cases}$$
8. (10 points) Given $f_Y$ below, graph $f_Y$ and $F_Y$. Then compute $P(1.5 < Y < 3.5)$ (by any means).

$$f_Y(y) = \begin{cases} 
0, & y < 1 \\
\frac{3}{2}(x - 1), & 1 \leq y < 2 \\
0, & 2 \leq y < 3 \\
\frac{1}{4}, & 3 \leq y < 4 \\
0, & y > 4 
\end{cases}$$