MATH 241 Chapter 5 part 1 Live Exercises

1. Suppose that X is a continuous random variable whose pdf is

$$f(x) = \begin{cases} c(8x - 4x^3) & \text{if } 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

   - Find $P(X > 0.5)$.

2. Suppose that X is a continuous random variable whose pdf is

$$f(x) = \begin{cases} c(8x - 4x^3) & \text{if } 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

   - Find the cdf function $F(x)$.

3. Comparing discrete random variables and continuous random variables.

	discrete	continuous
values can take		
pmf / pdf		
validness (i.e. the sum of probability is 1)		
cdf		
from cdf to pmf / pdf		
probability at a single point		

4. Find $E[e^X]$, if the pdf of X is given by

$$f(x) = \begin{cases} 1 & \text{if } 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

5. X is a continuous random variable. Its pdf $f(x)$ is an even function, i.e.,

$$f(-x) = f(x), \quad \text{for any } x > 0$$

   What is $E[X]$? Show your work.

   (a) Cannot decide. Need more information.

   (b) 0

   (c) 1

   (d) e

6. The density function of X is given by

$$f(x) = \begin{cases} a + bx^2 & \text{if } 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$$

If $E[X] = \frac{3}{5}$, find a and b.

7. Comparing discrete random variables and continuous random variables.

	discrete	continuous
E[X]		
E[g(X)]		
Var(X)		
σ		
E[aX+b]		
Var(aX+b)		
E[X+Y]		

8. If X is uniformly distributed over $(0, 10)$, calculate the probability that

    (a) $X < 3$

    (b) $X > 6$

    (c) $3 < X < 8$