Homework 6

BSTA 550

2023-11-16

> **!** HW 6 Due Date
>
> You can turn in the homework any time through Sunday, November 19th.

Directions

Please turn in this homework on Sakai. Please submit your homework in pdf format. You can type your work on your computer or submit a photo of your written work or any other method that can be turned into a pdf. Please let me know if you greatly prefer to submit a physical copy. We can work out another way for you to turn in homework.

Try to complete all of the problems listed below at some point this quarter! You may want to save some of them for studying later! Only turn in the ones listed in the "Turn In" column. Please submit problems in the order they are listed.

The more work you include that shows your thought process, the more I can give you feedback.

Chapter	Turn In	Extra Problems
Calculus Review		NTB # 1
24	TB # 19, 20*	# 2, 3, 7, 17, 18, 22, 23

*Also find the cdf $F_X(x)$

Non-textbook problems (NTB)

1. Calculus Review

   a. $$\int_0^y c(x+y)dx$$

   b. $$\frac{d}{dx}\left(\frac{4}{9}x^2y^2+\frac{5}{9}xy^4\right)$$

   c. $$\frac{d}{dy}\left(\frac{4}{9}x^2y^2+\frac{5}{9}xy^4\right)$$

   d. $$\int_0^y 2e^{-x}e^{-y}dx$$

   e. $$\int_0^\infty xye^{-(x+y)}dy$$

   f. $$\int_x^{2x} 2e^{-(x+3y)}dy$$

   g. Find the area of the region bounded by the graphs of $f(x)=2-x^2$ and $g(x)=x$ by integrating with respect to x.
   h. Find the area of the region bounded by the graphs of $f(x)=2-x^2$ and $g(x)=x$ by integrating with respect to y.
   i. Find the area of the region bounded by the graphs of $x=3-y^2$ and $y=x-1$ by integrating with respect to x.
   j. Find the area of the region bounded by the graphs of $x=3-y^2$ and $y=x-1$ by integrating with respect to y.

Some select answers

Selected answers (or hints) not provided at the end the book:

- Calculus Review
  - (a) $c(\frac{y^2}{2}+y^2)$
  - (b) $\frac{8}{9}xy^2+\frac{5}{9}y^4$
  - (c) $\frac{8}{9}x^2y+\frac{20}{9}xy^3$

- (d) $-2e^{-2y} + 2e^{-y}$
- (e) xe^{-x}
- (f) $-\frac{2}{3}(e^{-7x} - e^{-4x})$
- (g) $\frac{9}{2}$
- (h) $\frac{9}{2}$
- (i) $\frac{9}{2}$
- (j) $\frac{9}{2}$

- Chapter 24
  - # 2: (a) Discrete (b) Discrete (c) Continuous
  - # 22:

$$f_X(x) = \begin{cases} 0 & x < 0 \\ \frac{7x}{4} & 0 \le x \le 1 \\ 0 & 1 < x < 7 \\ \frac{1}{8} & 7 \le x \le 8 \\ 0 & x > 8 \end{cases}$$

- Chapter 25
  - # 4: 7/16
  - # 8: (a) $\frac{25}{228}$ (b) $f_X(x) = \frac{1}{12}(x+1)$, for $0 \le x \le 4$ (c) $f_Y(y) = \frac{3}{76}(y^2+1)$, for $0 \le y \le 4$
  - # 18: 5/6
  - # 24: (a) $f_X(x) = -2e^{-2x} + 2e^{-x}$, for $x \ge 0$ (b) $f_Y(y) = 2e^{-2y}$, for $y \ge 0$

- Chapter 26
  - # 12: (b) $\frac{233}{256}$ (c) $\frac{65}{256}$ (d) $\frac{1}{512}$
  - # 20: (a) Yes. (b) $\frac{15}{16}$
  - NTB # 3: (b) 0.09999546 (d) $f_Z(z) = \left(\frac{11}{5} - \frac{2z}{5}\right)e^{-2z}$, for what values of z?

- Chapter 27
  - # 6: $f_{X|Y}(x|y) = \frac{e^{-x/4-y/5}}{4(e^{-y/5}-e^{-9y/20})}$, for $0 < x < y$
  - # 8: $f_{X|Y}(x|y) = \frac{1-x^2}{1-y-\frac{(1-y)^3}{3}}$, for $0 \le x, 0 \le y, x+y \le 1$
  - # 12: (a) $f_{X|Y}(x|y) = \frac{1}{2}$ (c) $\frac{4}{7}$