

Homework 1 – part 2

Introductory Calculus

Date given: 08/27

Date due: 09/03 noon

First consider this univariate function

$$f(x) = \begin{cases} 1/b & \forall x \in [0, b] \\ 0, & \text{o.w. (otherwise)} \end{cases}$$

- a. Calculate $\int_0^{0.5b} dx f(x)$
- b. Calculate $\int_{-\infty}^{\infty} dx f(x)$
- c. Calculate $\int_{-\infty}^{\infty} dx x f(x)$
- d. Calculate $\int_{-\infty}^{\infty} dx x^2 f(x)$

Then consider this other univariate function

$$f(x) = \begin{cases} 2x/b^2 & \forall x \in [0, b] \\ 0, & \text{o.w. (otherwise)} \end{cases}$$

- e. Calculate $\int_{-\infty}^{\infty} dx f(x)$
- f. Calculate $\int_{-\infty}^{\infty} dx x f(x)$
- g. Calculate $\int_{-\infty}^{\infty} dx x^2 f(x)$

Finally consider this bivariate function

$$f(x, y) = \begin{cases} 1/b^2 & \forall x \in [0, b] \text{ and } \forall y \in [0, b] \\ 0, & \text{o.w. (otherwise)} \end{cases}$$

- h. Calculate $\int_0^b dx \int_0^{0.5b} dy f(x, y)$
- i. Calculate $\int_{-\infty}^{\infty} dx \int_{-\infty}^{\infty} dy f(x, y)$

- j. Calculate $\int_{-\infty}^{\infty} dx \int_{-\infty}^{\infty} dy x f(x, y)$
- k. Calculate $\int_{-\infty}^{\infty} dx \int_{-\infty}^{\infty} dy y f(x, y)$
- l. Calculate $\int_{-\infty}^{\infty} dx \int_{-\infty}^{\infty} dy xy f(x, y)$
- m. Calculate $\int_{-\infty}^{\infty} dx \int_{-\infty}^{\infty} dy x^2 f(x, y)$
- n. Calculate $\int_{-\infty}^{\infty} dx \int_{-\infty}^{\infty} dy y^2 f(x, y)$
- o. Calculate $\int_{-\infty}^{\infty} dx f(x, y)$

Derive each result by hand, and provide a well written report of your derivations and results to the instructor. You may scan your hard copy to a pdf file and send it by email, or you can turn in a hard copy directly to the instructor's mailbox or office (no staples please, instead please use paper clips).