

## MA 416 final review problems

Version as of December 12th.

The final exam will be as scheduled here [https://www.purdue.edu/registrar/faculty/scheduling/even-final\\_exam\\_schedule.html](https://www.purdue.edu/registrar/faculty/scheduling/even-final_exam_schedule.html). No notes, books, or electronic devices will be allowed. Most of the exam will be closely based on problems from the list below. Justify your answers, and do simple simplifications but not complicated ones. Please let me know if you have a question or find a mistake.

1. All the problems from both midterm reviews.
2. Let  $X$  and  $Y$  be as in Problem 19 of Chapter 6. Find  $\text{Cov}(X, Y)$ .
3. The Exercise from <https://www.math.purdue.edu/~kdatchev/416/linpred.pdf>.  
*Hint:* Use  $\frac{d}{dx}e^{-x^2/2} = -xe^{-x^2/2}$ .
4. Write  $E[(X + Y)^2]$  in terms of  $E[X]$ ,  $E[Y]$ ,  $\text{Var}(X)$ ,  $\text{Var}(Y)$ , and  $\text{Cov}(X, Y)$ .

Also the following from the book:

- Chapter 6, Problems 13, 15, 19, 21.
- Chapter 7, Problems 5, 6, Self-Test 22ab, 33.
- Chapter 8, Problems 6, 16, Self-Test 6, 7, 9.

Use the table for the cumulative standard normal distribution function on the next page.

**Table 5.1** Area  $\Phi(x)$  Under the Standard Normal Curve to the Left of  $X$ .

[illegible]

Here are short answers; a proper solution includes some clear steps leading to these answers. Note also the book has many answers at the back, including complete solutions for the Self-Test problems.

1.

2.  $1/24$

3.  $\sqrt{\frac{2}{\pi}}(2I - 1)$

4.  $\text{Var}(X) + E[X]^2 + 2\text{Cov}(X, Y) + 2E[X]E[Y] + \text{Var}(Y) + E[Y]^2.$