18.06 Spring 2013 – Problem Set 5

This problem set is due Thursday, March 21st, 2013 at 4pm (hand in to Room 2-255). The textbook problems are out of the 4th edition. A correct answer will only earn you half of the available points. The other half of the points come from your explanation.

   Note: Your recitation instructor is responsible for allowing late homework submissions, as well as the re-grading of your PSet. If there is any problem with your PSet, contact your recitation instructor!

1. (8 pts) Do Problem 16 & Problem 17 from Section 4.3.

2. (8 pts) Do Problem 26 from Section 4.3.

3. (8 pts) Do Problem 8 & Problem 10 from Section 4.4.

4. (8 pts) Do Problem 11 & Problem 18 from Section 4.4.

5. (8 pts) Do Problem 24 from Section 4.4.

6. (8 pts) Do Problem 1 & Problem 5 from Section 5.1.

7. (8 pts) Do Problem 12 & Problem 15 from Section 5.1.

8. (8 pts) Do Problem 34 from Section 5.1.

9. (18 pts) Apply the Gram-Schmidt idea to the functions (more specifically, the three functions in the vector space of polynomials given by) $1, x, x^2$ to produce three orthonormal polynomials. To define orthonormality, you need an inner product (denoted $f \cdot g$ of functions to replace $x \cdot y = x^T y$ for vectors:

$$f \cdot g = \int_{-1}^{1} f(x)g(x)dx.$$

10. (18 pts) Lewis Carroll discovered an identity for determinants. Verify that it is correct for a 3×3 matrix M, when A, B, C, D are the 2×2 matrices in the four corners of M (overlapping in the center entry M_{22}):

$$(M_{22}) \det M = (\det A)(\det D) - (\det B)(\det C)$$