

1016-351-70

Probability

Problem Set 5

Assigned 2010 April 13
Due 2010 April 20

Show your work on all problems!

- 1 Devore Chapter 4, Problem 8
- 2 Devore Chapter 4, Problem 20
- 3 Devore Chapter 4, Problem 32
- 4 Devore Chapter 4, Problem 54
- 5 Computational Exercise (Extra Credit)

This problem will help you illustrate explicitly how a binomial distribution can be approximated by a normal distribution.

- a. Consider a binomial random variable X with $n = 80$ and $p = 0.25$; plot its pmf $b(x; n, p)$.
- b. Construct the corresponding normal random variable Y (remembering to use the continuity correction) and plot its pdf.
- c. The pmf in part (a) and the pdf in part (b) should look similar, but because of the different normalization conditions, you can't plot them on the same set of axes without scaling one or the other. But their cdfs are directly comparable. Plot, on the same set of axes, the cumulative distribution function $B(x; n, p)$ and the corresponding approximate cdf using the function $\Phi(z)$. Hint: if you use matplotlib, the following function will be useful for calculating $\Phi(z)$:

```
import scipy
from scipy.special import erf

def Phi(z):
    return 0.5 * ( 1 + erf(z/np.sqrt(2)) )
```