Show all of your work. Please staple in the upper left hand corner.

1. Chapter 6 - End of chapter exercises: Problem 6
2. Chapter 6 - End of chapter exercises: Problem 13 (a-d)
3. Chapter 6 - End of chapter exercises: Problem 27
4. You have a coin that has a probability of p of landing on heads. Your friend told you that they didn't think it was a fair coin so you decide you want to run a test. Your testing procedure to test $H_0 : p = 0.5$ against $H_a : p \neq 0.5$ is as follows:

   - Flip the coin 7 times and count how many heads there are (call this number X)
   - If $X = 0$ or if $X = 7$ reject H_0, otherwise fail to reject H_0.

   Answer the following questions:

   (a) What is the type I error rate for this testing procedure?

   (b) If in actuality the coin is such that $p = .75$ what is the type II error rate for this testing procedure?

   (c) If you change the rejection criteria to: If X is either 0, 1, 6, or 7 then reject H_0, otherwise fail to reject

   i. What is the type I error rate now?

   ii. What is the type II error rate (assuming $p = .75$)?

   (d) By changing the value for n and the rejection region find a test such that the type I error rate is less than .1 and the type II error rate is less than .5 (assume $p = .75$ when calculating the type II error rate)

   (e) Bonus: You have a biased coin such that p is not equal to 0, 0.5, or 1. Can you come up with a procedure for using that coin to generate outcomes from a $Binomial(n = 1, p = .5)$ random variable? (Essentially can you find a way to remove the bias from a weighted coin)