

## Assignment 6, Discrete Math

Covers sections 5.1, 5.2, 5.3

When calculations are a bit too painful for pen-and-paper, feel free to use a calculator to do basic computations.

Don't forget, even though it is Fall Break on October 10-11, *we have a quiz on Wednesday October 12!*

1. 5.1 #3
2. 5.1 #6(f)
3. 5.1 #8(a)
4. 5.1 #9(h)
5. Critique the following (bogus) proof that all sharks have the same color.

We show that the statement “for any set of  $n$  sharks, all the sharks in the set have the same color,” is true for all  $n \in \mathbb{N}$ . Because there are only finitely many sharks, this shows that all sharks have the same color.

First, suppose  $n = 1$ . Clearly, if there is exactly one shark in the set, then all sharks have the same color.

Now, suppose the result is true for  $n = k$ , so for any set of  $k$  sharks, all the sharks have the same color. We show this is true for  $n = k + 1$ . Let  $\{H_1, \dots, H_{k+1}\}$  be a set of  $k + 1$  sharks. The set  $\{H_1, \dots, H_k\}$  has  $k$  sharks, so all sharks in  $\{H_1, \dots, H_k\}$  have the same color. However, the set  $\{H_2, \dots, H_{k+1}\}$  also has  $k$  sharks, so all sharks in this set have the same color. In particular,  $H_{k+1}$  has the same color as  $H_k$ , hence all sharks in the set  $\{H_1, \dots, H_{k+1}\}$  have the same color.

6. 5.2 #1(b)-(c)
7. 5.2 #6
8. 5.2 #33(c)-(d)
9. 5.3 #2
10. 5.3 #18 (to find a particular solution, use  $p_n = a \cdot 5^n$  as your guess and solve for  $a$ )