

MAT 200: HOMEWORK 3

DUE WED, FEB 24

1. You are given the following statements:

$$A \wedge B \rightarrow C$$

$$B \vee D$$

$$C \vee \neg D$$

Using this, prove $A \rightarrow C$.

2. Textbook, p. 54, problem 12

3. Textbook, p. 55, problem 14

4. Textbook, p. 55, problem 16

5. Textbook, p. 55, problem 17

6. Guess a formula for the product

$$\left(1 - \frac{1}{2^2}\right) \left(1 - \frac{1}{3^2}\right) \cdots \left(1 - \frac{1}{n^2}\right)$$

and prove it using induction. [Hint: try computing the answer for $n = 2, 3, 4, 5$ and writing it as a fraction with denominator $2n$; see if you can guess the pattern.]

7. Let the sequence F_n be defined by the formulas

$$F_1 = 1$$

$$F_2 = 1$$

$$F_n = F_{n-1} + F_{n-2} \quad \text{for } n \geq 3$$

(this sequence is called the Fibonacci numbers).

Use strong induction to prove the following formula:

$$F_1 + F_2 + \cdots + F_n = F_{n+2} - 1.$$