Assignment 6, Math 240, Fall 2005

Due: 2:45pm, September 27. Value: 12 pts.

These are extra-credit problems. If, however, your grade is close to 100% already, I will not award you more points than will push you to 100%.

Problem A. Prove that every group of three consecutive odd numbers greater than 3 must include a composite number. (An example group of three consecutive odd numbers is 23, 25, and 27; note that 25 is composite in this group.)

Problem B. For each of the following functions, say whether the function is one-to-one, onto, both, or neither, and justify your answers. Recall that $\mathcal{P}(S)$ is the set of all subsets of S.

a. the function $f : \mathcal{P}(\{0, 1, 2\}) \to \{0, 1, 2\}$ where $f(x)$ is defined to be the smallest element in x.

b. the function $f : \{0, 1, 2\} \to \mathcal{P}(\{0, 1, 2\})$ where $f(x)$ is defined to be $\{x\}$.

Problem C. Prove via induction that for $n \geq 1$,

$$\sum_{i=1}^{n} \frac{1}{i(i+1)} = 1 - \frac{1}{n+1}\,.$$