Extra Credit

Proof Practice

TCSS 321

Prove or disprove the following:

1. The sum of an irrational number and a rational number is irrational.
2. Let m and n be integers. If mn is even, then m is even or n is even.
3. 2 divides $n^2 + n$ whenever n is a positive integer.
4. If n is a perfect square, then $n + 2$ is not a perfect square.
5. If n is an integer greater than 4, then $2^n > n^2$.
6. At least ten of any 64 days chosen must fall on the same day of the week.
7. The $\sqrt{2}$ is irrational.
8. We can tile a standard checkerboard with the upper left and lower right corner squared deleted with dominoes (where each domino covers two squares on the checkerboard).
9. The number $5x + 5y$ is an odd integer when x and y are integers of opposite parity.
10. Either $2 \cdot 10^{400} + 10$ or $2 \cdot 10^{400} + 11$ is not a perfect square.
11. There are no integer solutions of x and y to the equation $2x^2 + 5y^2 = 15$.
12. There is no positive integer n such that $n^2 + n^3 = 100$.
13. Every positive integer is the sum of 36 fifth powers of nonnegative integers
14. Assume the truth of the theorem: $\sqrt{n}$ is irrational whenever n is a positive integer that is not a perfect square. Is $\sqrt{2} + \sqrt{3}$ irrational or not?
15. Dominoes cannot tile a standard checkerboard with the four corners removed.
16. A checker board with the same number of white squares as black, is tillable by dominoes.