Math 6051/3051: Recitation 1

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Do any **four** of the following problems.

(1) Show that the sum of two odd numbers is even.

(2) Prove

$$1 + \frac{1}{2} + \frac{1}{4} + \cdots + \frac{1}{2^n} = 2 - \frac{1}{2^n}$$

for all positive integer n. *(Use induction.)*

(3) Prove $7^n - 6n - 1$ is divisible by 36 for all positive integer n. *(Use induction.)*

(4) Let

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}.$$

Show that

$$\binom{n}{k} + \binom{n}{k-1} = \binom{n+1}{k}$$

(5) Show that $\sqrt{2+\sqrt{2}}$ is not a rational number.