math induction #2 Prove by induction: $\sum_{i=1}^{n} (2i-1) = n^2$

1. For n = 1, $2(1) - 1 = 1^2$

   $1 = 1$

2. Assume that $1 + 3 + 5 + \ldots + (2(k-1) - 1) = (k - 1)^2$.

3. Show that $1 + 3 + 5 + \ldots + (2k - 1) = k^2$.

Proof: $1 + 3 + 5 + \ldots + (2k - 3) = k^2 - 2k + 1$

$1 + 3 + 5 + \ldots + (2k - 3) + (2k-1) = k^2 - 2k + 1 + (2k-1)$

$= k^2$

Prove by induction: $\sum_{i=1}^{n} \frac{1}{i(i+1)} = \frac{n}{n+1}$

math induction #3

1. For $n = 1$: $\frac{1}{1(1+1)} = \frac{1}{1+1}$

$$\frac{1}{1(2)} = \frac{1}{2}$$

$$\frac{1}{2} = \frac{1}{2}$$

2. Assume that

$$\frac{1}{1(2)} + \frac{1}{2(3)} + \frac{1}{3(4)} + \ldots + \frac{1}{(k-1)(k-1+1)} = \frac{k-1}{(k-1)+1}$$

3. Show that

$$\frac{1}{1(2)} + \frac{1}{2(3)} + \frac{1}{3(4)} + \ldots + \frac{1}{k(k+1)} = \frac{k}{k+1}$$

Proof:

$$\frac{1}{1(2)} + \frac{1}{2(3)} + \frac{1}{3(4)} + \ldots + \frac{1}{(k-1)(k)} = \frac{k-1}{k}$$

$$\frac{1}{1(2)} + \frac{1}{2(3)} + \frac{1}{3(4)} + \ldots + \frac{1}{(k-1)(k)} + \frac{1}{K(K+1)} = \frac{k-1}{k} + \frac{1}{K(K+1)}$$

$$= \frac{(K-1)(K+1)+1}{K(K+1)}$$

$$= \frac{K^2-1+1}{K(K+1)}$$

$$= \frac{K^2}{K(K+1)}$$

$$= \frac{K}{K+1}$$