## Quiz 13

## Time:10min

Choose one of the following two sets of problems:

## Set 1.

1. Show that the power series representation for $\frac{1}{1+x}$ is given by $1-x+x^{2}-$ $x^{3}+x^{4} \ldots$, by recalling the summation formula for the geometric series.
2. Use the above problem and a term by term integration to find a power series for $\ln (1+x)$.
3. Use the previous problem to find the sum of the alternating harmonic series.

## Set 2.

1. Use problem 1 in the first set above to find a power series representation for $\frac{1}{1+x^{2}}$.
2. Use the previous problem and a term by term integration to find a power series for $\tan ^{-1} x$.
3. Use the previous problem to obtain a series which converges to $\pi$.

Each set is worth a total of 10 points.

