Remember that in the last homework you showed: if $0 < L < 1$ and $f_n(x) = \sum_{k=0}^{n} x^k$ then $\{f_n\}$ converges uniformly to some $f$ on $[-L, L]$.

1. Show that $f(x) = \dfrac{1}{1-x}$ on $(-1, 1)$.

2. Show that if $-1 < x < 1$ then:
$$\lim_{n \to \infty} \sum_{k=1}^{n} \frac{x^k}{k} = -\ln(1-x)$$

3. Use the above with $n = 8$ to estimate $\ln(2)$.