Math 461
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Some Special Infinite Series

- $\dfrac{1}{1-x} = 1 + x + x^2 + x^3 + \cdots = \sum_{n=0}^{\infty} x^n$ for $|x| < 1$
- $\ln(1-x) = -x - \dfrac{x^2}{2} - \dfrac{x^3}{3} - \cdots = -\sum_{n=1}^{\infty} \dfrac{x^n}{n}$ for $|x| < 1$
- $\ln(1+x) = x - \dfrac{x^2}{2} + \dfrac{x^3}{3} - \dfrac{x^4}{4} + \dfrac{x^5}{5} = \sum_{n=1}^{\infty} (-1)^{n+1} \dfrac{x^n}{n}$ for $|x| < 1$
- $e^x = 1 + x + \dfrac{x^2}{2!} + \cdots = \sum_{n=0}^{\infty} \dfrac{x^n}{n!}$ for all x
- $(1+x)^k = 1 + kx + \dfrac{k(k-1)}{2!}x^2 + \dfrac{k(k-1)(k-2)}{3!}x^3 + \cdots = \sum_{n=0}^{\infty} \binom{k}{n} x^n$, where k is any real number, $|x| < 1$, and $\binom{k}{n} = \dfrac{k(k-1)\cdots(k-n+1)}{n!}$ for $n \geq 1$ and $\binom{k}{0} = 1$