

# MATH 426

20.  $\sum_{n=1}^{\infty} \frac{(2x-1)^n}{5^n \sqrt{n}} \Rightarrow \frac{1}{5^n \sqrt{n}} \cdot (2x-1)^n$   $2x-1=0$   
 $2x=1 \Rightarrow x=\frac{1}{2}$

Ratio Test:  $\left| \frac{(2x-1)^{n+1}}{5^{n+1} \sqrt{n+1}} \cdot \frac{5^n \sqrt{n}}{(2x-1)^n} \right| = \frac{|2x-1|}{5} \cdot \sqrt{\frac{n}{n+1}}$

$\lim_{n \rightarrow \infty} \sqrt{\frac{n}{n+1}} = 1$   $\frac{1}{1} = 1$   $\sqrt{1} = 1$

$\frac{|2x-1|}{5} < 1 \Rightarrow -1 < \frac{2x-1}{5} < 1 \Rightarrow -5 < 2x-1 < 5 \Rightarrow -4 < 2x < 6 \Rightarrow -2 < x < 3$

interval:  $[-2, 3]$   $R=3$

24.  $\sum_{n=1}^{\infty} \frac{n^2}{2n} \cdot x^n$

Ratio Test:  $\left| \frac{(n+1)^2 x^{n+1}}{2(n+1)} \cdot \frac{2n}{n^2 x^n} \right| = \frac{(n+1)^2}{n^2} \cdot \frac{2n}{2(n+1)} \cdot |x| = \frac{n+1}{n} |x|$

$\lim_{n \rightarrow \infty} \frac{n+1}{n} |x| = |x|$

$|x| < 1 \Rightarrow -1 < x < 1$   $R=1$

interval:  $(-1, 1)$

30.  $\mathbb{C}$

4.  $f(x) = \frac{5}{1-4x^2} \Rightarrow 5 \left( \frac{1}{1-4x^2} \right)$   $\sum_{n=0}^{\infty} (4x^2)^n \Rightarrow \left| \frac{4x^2}{1} \right| < 1$

$-\frac{1}{4} < x^2 < \frac{1}{4} \Rightarrow -\frac{1}{2} < x < \frac{1}{2}$  interval:  $(-\frac{1}{2}, \frac{1}{2})$

10.  $f(x) = \frac{x+a}{x^2+a^2}$  (x)  $\frac{1+a}{x^2+a^2} \rightarrow \frac{1}{a^2} \cdot \frac{x}{1+\frac{x^2}{a^2}}$

$\frac{x}{a^2} \sum_{n=0}^{\infty} \left( \frac{-x^2}{a^2} \right)^n \rightarrow \frac{x}{a^2} \sum_{n=0}^{\infty} (-1)^n \left( \frac{x^2}{a^2} \right)^n$