

HW 10.8

#3 $\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n}}$

$$= \frac{x^1}{\sqrt{1}} + \frac{x^2}{\sqrt{2}} + \frac{x^3}{\sqrt{3}} + \dots$$
$$= x + \frac{1}{\sqrt{2}}x^2 + \frac{1}{\sqrt{3}}x^3 + \dots$$

RATIO TEST

$$\lim_{n \rightarrow \infty} \left| \frac{x^{n+1}}{\sqrt{n+1}} \cdot \frac{\sqrt{n}}{x^n} \right| = \lim_{n \rightarrow \infty} |x| \frac{\sqrt{n}}{\sqrt{n+1}}$$

$$= |x|$$

$$|x| < 1 \rightarrow R$$

$$-1 < x < 1 : \text{LNT}$$

$$[-1, 1)$$

CHECK $x = -1$

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}} = \sum_{n=1}^{\infty} (-1)^n \cdot \frac{1}{n^{1/2}}$$

ALT. SER TEST

CONVERGES

CHECK $x = 1$

$$\sum_{n=1}^{\infty} \frac{1^n}{\sqrt{n}} = \sum_{n=1}^{\infty} \left(\frac{1}{n}\right)^{1/2}$$

P-SERIES $p = \frac{1}{2} < 1$ DIVERGES

$$\textcircled{9} \sum (-1)^n \frac{n^2 x^n}{2^n}$$

$$\lim_{n \rightarrow \infty} \left| \frac{(-1)^{n+1} (n+1)^2 x^{n+1}}{2^{n+1}} \cdot \frac{2^n}{(-1)^n n^2 x^n} \right| = \lim_{n \rightarrow \infty} \left(\frac{n+1}{n} \right) \frac{1}{2} |x|$$

$$= \frac{|x|}{2} < 1$$

$$|x| < 2$$

$$-2 < x < 2$$