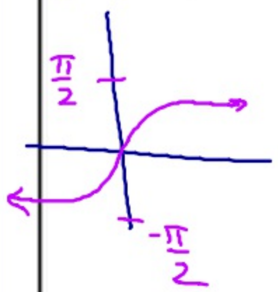
D) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^{3/2}}$

arctan x



Series converges b/c Area converges

E) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2+9}$

$$\lim_{b\to\infty} \int_1^b \frac{1}{x^2+9}\,dx = \lim_{b\to\infty} \left[\frac{1}{3}\arctan\frac{x}{3}\right]_1^b = \lim_{b\to\infty}\left[\frac{1}{3}\arctan\frac{b}{3} - \frac{1}{3}\arctan\frac{1}{3}\right]$$

$$\frac{1}{3}\left(\frac{\pi}{2}\right) - \frac{1}{3}\arctan\frac{1}{3}$$

Area converges

P-Series Test

A) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2}$ $p = 2 > 1$ converges

B) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^1}$ Harmonic Diverges $p = 1 \le 1$ diverges

C) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^{1/3}}$ $p = \frac{1}{3} \le 1$ diverges

D) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^{3/2}}$ $p = \frac{3}{2} > 1$ convergence

E) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^{5/2}}$ $p = \frac{5}{2} > 1$ converges

F) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^{1/2}}$ $p = \frac{1}{2} \le 1$ diverges

original terms smaller than comparison	Direct Comparison Test A) $\sum_{n=1}^{\infty}\frac{1}{n^2+9}$ compare to $\sum_{n=1}^{\infty}\frac{1}{n^2}$ $p=2>1$ converges $\sum \frac{1}{n^2+9}$ converges b/c $\frac{1}{n^2+9} < \frac{1}{n^2}$
	$\sum \frac{1}{n^2} = 1+\frac{1}{4}+\frac{1}{9}+\frac{1}{16}+\cdots$ $\sum \frac{1}{n^2+9} = \frac{1}{10}+\frac{1}{13}+\frac{1}{18}+\frac{1}{25}+\cdots$
original terms bigger than comparison	B) $\sum_{n=4}^{\infty}\frac{n}{n^2-9}$ compare to $\sum_{n=4}^{\infty}\frac{1}{n}$ Harmonic diverges $\sum_{n=4}^{\infty}\frac{n}{n^2-9}$ diverges b/c $\frac{n}{n^2-9} > \frac{1}{n}$
	$\sum_{n=4}^{\infty}\frac{1}{n} = \frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\frac{1}{7}+$ $\sum_{n=4}^{\infty}\frac{n}{n^2-9} = \frac{4}{7}+\frac{5}{16}+\frac{6}{27}+\frac{7}{40}$
	C) $\sum_{n=1}^{\infty}\frac{n}{n^2+9}$ Compare to $\sum_{n=1}^{\infty}\frac{1}{n}$ Harmonic Diverges $\sum \frac{1}{n} = 1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}$ $\sum \frac{n}{n^2+9} = \frac{1}{10}+\frac{2}{13}+\frac{3}{18}+\frac{4}{25}+\cdots$