So 
$$\lim_{n \to \infty} \frac{1-n}{n} = -10$$

So  $\lim_{n \to \infty} \frac{3^n}{n} = 3^n = \frac{1}{3} \neq 0$ 

By DIVERGENCE TEST

 $\int_{n=1}^{\infty} 3^n$ 

DIVERGES

$$\sum_{n=1}^{\infty} \frac{2+2^{2n}}{5^n}$$
=  $\sum_{n=1}^{\infty} 2 \cdot (\frac{1}{5})^n + \sum_{n=1}^{\infty} (\frac{4}{5})^n$ 
(BOTH GEOMETRIC SERIES)
$$r = \frac{1}{5} \quad \text{AND} \quad r = \frac{4}{5}$$
=  $\frac{2}{5}$ 

$$= \frac{2}{5} + \frac{4}{5}$$

$$= \frac{1-\frac{1}{5}}{1-\frac{1}{5}} + \frac{1}{1-\frac{4}{5}} = \frac{1}{2} + \frac{4}{1}$$

$$=\frac{1}{2}+4$$
 $=\frac{9}{2}$ 

$$\left\{\frac{n}{\sqrt{1+4n^2}}\right\}$$

$$\lim_{n\to\infty} \frac{n}{\sqrt{1+4n^2}}$$

$$=\lim_{n\to\infty} \frac{n}{\sqrt{1+4n^2}}$$

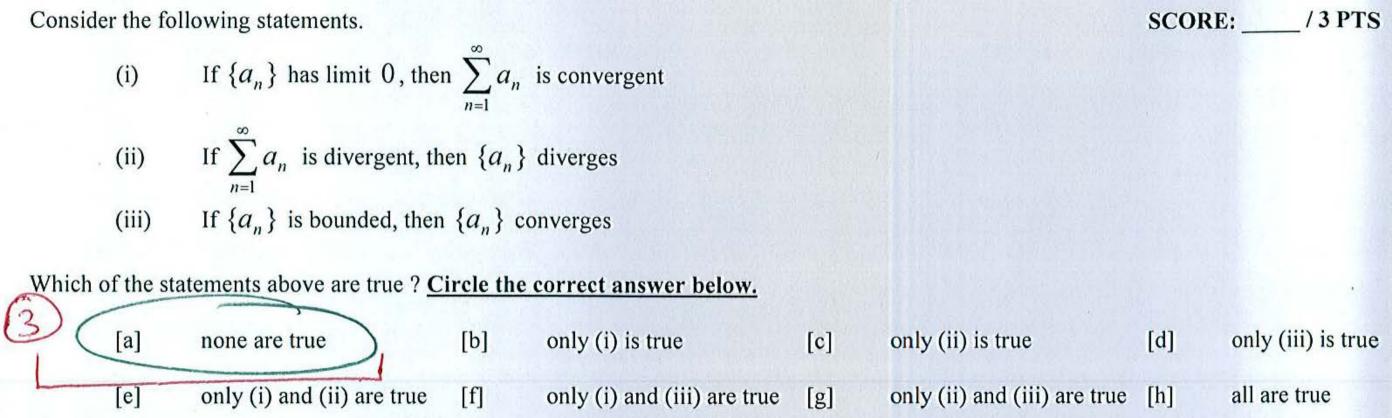
$$=\lim_{n\to\infty} \frac{n}{\sqrt{1+4n^2}}$$

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Find all values of x for which  $\sum_{n=0}^{\infty} 2^{n+1} (3-x)^n$  is convergent. You do NOT need to find the sum.

$$= 2 + 2^{2}(3-x) + 2^{3}(3-x)^{2} + \cdots$$

$$= \frac{12(3-x)|<1}{-1<2(3-x)}<1$$

$$= -\frac{1}{2}<3-x<1$$

$$= -\frac{1}{2}<3-x<\frac{1}{2}$$

52 × × 2 2 (2)

SCORE:

## Justify each answer using proper mathematical reasoning and/or algebra.

Your solutions must NOT use derivatives.

[a] 
$$\left\{\frac{3n-5}{4n-3}\right\}$$

$$a_{n+1}-a_n = \frac{3(n+1)-5}{4(n+1)-3} - \frac{3n-5}{4n-3}$$

$$3n-2 \quad 3n-5 \quad \infty$$

$$= \frac{3n-2}{4n+1} - \frac{3n-5}{4n-3}$$

$$= \frac{11}{(4n+1)(4n-3)}$$

[b] 
$$\left\{\frac{5n-11}{2n-5}\right\} = \left\{2,1,4,\ldots\right\}$$
MOTHER (1)