Monday, March 22, 2021 5:52 PM

1. FIND THE EXPLICIT FORMULA FOR THE SEQUENCE $5, \frac{3}{4}, \frac{1}{9}, -\frac{1}{16}, -\frac{3}{25}, \ldots$

NOTE THAT $5 = 5/1$.

SO THE NUMERATORS ARE $5, 3, 1, -1, -3, \ldots$

DENOMINATORS ARE $1, 4, 9, 16, 25, \ldots$

IF WE LET THE FIRST TERM BE a_0, WE HAVE

$$a_1 = \frac{5}{1} = \frac{5-2\cdot 0}{1^2} \qquad a_3 = \frac{1}{9} = \frac{5-2\cdot 3}{3^2}$$

$$a_2 = \frac{3}{4} = \frac{5-2\cdot 1}{2^2} \qquad a_4 = \frac{-1}{16} = \frac{5-2\cdot 4}{4^2} \quad \text{ETC.}$$

SO $\boxed{a_n = \frac{5-2(n-1)}{n^2} \quad \text{OR} \quad \frac{7-2n}{n^2}}$

2. FIND THE LIMIT $\lim\limits_{n\to\infty}\left(3\sqrt{a_n} + \frac{\cos(n^2 a_n)}{2n^5-1}\right)$

WHERE $a_n = \frac{7-2n}{n^2}$.

SINCE $\lim\limits_{n\to\infty} a_n = 0$,

$$\lim_{n\to\infty}\left(3\sqrt{a_n} + \frac{\cos(n^2 a_n)}{2n^5-1}\right) = 3\sqrt{0} + \frac{\cos(0)}{\lim\limits_{n\to\infty}(2n^2-1)}$$

$$= 0 + \frac{1}{\lim\limits_{n\to\infty}(2n^2+1)} = 0.$$