HW 11.1 #1-63 every other odd

Heather Graehl

Tuesday, April 10, 2007
7:59 PM

#s 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61

1.
   a. A sequence is a list of numbers in a definite order
   b. As the series approaches infinity, the value of the series approaches 8
   c. The series becomes infinitely larger.

$$a_n = \frac{3(-1)^n}{n!}$$

$$a_1 = \boxed{-3} \qquad a_3 = \frac{-3}{3\cdot2\cdot1} = \frac{-3}{6} = \boxed{\frac{-1}{2}}$$

$$a_2 = \boxed{\frac{3}{2}} \qquad a_4 = \frac{3}{4\cdot3\cdot2\cdot1} = \frac{3}{24} = \boxed{\frac{1}{8}}$$

$$a_5 = \frac{-3}{5\cdot4\cdot3\cdot2\cdot1} = \frac{-3}{120} = \boxed{\frac{-1}{40}}$$

9. $\left\{\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16} \cdots\right\}$

$$a_n = \boxed{\frac{1}{n^2}}$$

13. $\left\{1, -\frac{2}{3}, \frac{4}{9}, \frac{-8}{27}, \cdots\right\}$

$$a_n = \cancel{\frac{(-1)^n \cdot (n+1)}{3^n}} \qquad \boxed{\left(\frac{-2}{3}\right)^{n-1}}$$

17. $a_n = \dfrac{3+5n^2}{n+n^2}$

$$\lim_{n\to\infty} \frac{3+5n^2}{n+n^2} = \lim_{n\to\infty} \frac{\cancel{n^2}\left(\cancel{\frac{3}{n^2}}^{\,0} + 5\right)}{\cancel{n^2}\left(\cancel{\frac{1}{n}}_{\,0} + 1\right)} = \boxed{5}$$

$\boxed{\text{Converges}}$

21. $a_n = \dfrac{(-1)^{n-1}\,n}{n^2+1}$

$$\lim_{n\to\infty} \frac{(-1)^{n-1}\cancel{n}}{\cancel{n}(n+\frac{1}{\cancel{n}})} = \lim_{n\to\infty} \frac{(-1)^{n-1}}{n} = \boxed{0}$$

convergent

(25) $\left\{ \frac{(2n-1)!}{(2n+1)!} \right\}$

$$\lim_{n\to\infty} \frac{(2n-1)!}{(2n+1)!} = \lim_{n\to\infty} \frac{n(2-\frac{1}{n})!}{n(2+\frac{1}{n})!} = 1! = 1$$

(29) $\{n^2 e^{-n}\}$

$$\lim_{n\to\infty} \underset{\infty}{n^2}\, \underset{\infty}{e^{-n}} \qquad LHR$$

pg 312 let $y = e^{-n}$ $\quad \ln y = -n$

4.4 $\lim_{n\to\infty} n^2 \lim_{n\to\infty} -n$

(33) $a_n = n\sin(1/n)$

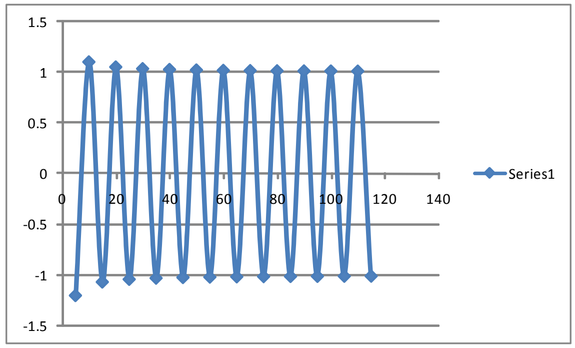
$$\lim_{n\to\infty} n\sin\left(\tfrac{1}{n}\right) = \lim_{n\to\infty} \frac{\sin(\frac{1}{n})}{\frac{1}{n}}$$

(37) $\{0,1,0,0,1,0,0,0,1\ldots\}$

divergent

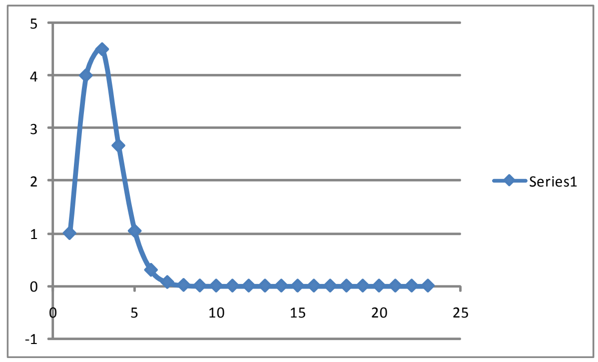
(41) $a_n = (-1)^n \dfrac{n+1}{n}$

$\boxed{\text{divergent}}$



(45) $a_n = \dfrac{n^3}{n!}$

$\boxed{\begin{array}{c}\text{convergent}\\ L=0\end{array}}$



(49) (a) $a_n = 1000(1.06)^n$

$a_1 = 1060$

$a_2 = 1123.6$

$a_3 = 1191.016$

$a_4 = 1262.47696$

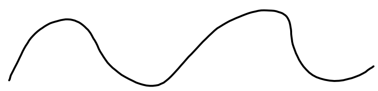
$a_5 = 1338.2255776$

(b) $\lim\limits_{n\to\infty} 1000(1.06)^n$

$\lim\limits_{n\to\infty} 1000 \lim\limits_{n\to\infty} 1.06^n$

(53) by theorem 11

(57) $a_n = \cos(n\pi/2)$



bounded increasing/decreasing depending on interval.

not monatonic

(61)