Math 141
Exam 2.2
March 18, 2016

name Kitty Katz

9. For the sequence, find the nth term, a_n. Start with the given value of n.

$$\left\{\frac{1}{2}, -\frac{4}{6}, \frac{9}{24}, -\frac{16}{120}, \frac{25}{720}, -\frac{36}{5040}\ldots\right\}, \quad n=1$$

$n=1$ $n=2$ $n=3$ $n=4$ $n=5$ $n=6$

$$a_n = (-1)^{n+1}\frac{n^2}{(n+1)!}$$

10. Determine the convergence or divergence of the sequence with given n^{th} term.

a. $a_n = \dfrac{2n^2}{n^2+1}$

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

or

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

L Hopitals

$$\lim_{n\to\infty} \frac{4n}{2n} = 2$$

converges

b. $a_n = \dfrac{2^n}{2^n+1}$

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

L Hopital's

$$\lim_{n\to\infty} \frac{\ln 2 \cdot 2^n (1)}{\ln 2 \cdot 2^n (1)} = 1$$

converges

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9. For the sequence, find the nth term, a_n. Start with the given value of n.

$$\left\{\frac{1}{1}, -\frac{4}{1}, \frac{9}{2}, -\frac{16}{6}, \frac{25}{24}, -\frac{36}{120}\cdots\right\}, \quad n=0$$

$n=0$ $n=1$ $n=2$ $n=3$ $n=4$ $n=5$

$$a_n = (-1)^n \frac{(n+1)^2}{n!}$$

10. Determine the convergence or divergence of the sequence with given n^{th} term.

a. $a_n = \dfrac{n^2}{2n^2+1}$

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

or

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

L Hopital's

$$\lim_{n\to\infty} \frac{2n}{4n} = 1/2$$

converges

b. $a_n = \dfrac{2^n}{2^{n+1}-1}$

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

L Hopital's

$$\lim_{n\to\infty} \frac{\ln 2 \cdot 2^n}{\ln 2 \cdot 2^{n+1}} =$$

$$\lim_{n\to\infty} \frac{2^n}{2^n \cdot 2^1} = 1/2$$

converges