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Calculus 1432

Quiz 11

April 4, 2014

1 points each

For each of the following, determine if L'Hopital's rule applies and if it does, write the indeterminate form.

1. $\lim_{x \rightarrow 0} \frac{e^x - 1}{x^2}$

$\left(\frac{0}{0}\right)$ form
L' applies ✓

2. $\lim_{x \rightarrow 0^+} (1+x)^{1/x}$

1^∞ - form
L' applies

3. $\lim_{x \rightarrow 0} \frac{\cos x}{x}$

$\frac{1}{0}$ diverges
L' doesn't apply

For each of the following, determine if the integral is improper. Give a reason for your answer.

4. $\int_1^5 \frac{1}{x-2} dx$

at $x=2$, $\frac{1}{x-2}$ is undefined.
So it is improper
since $2 \in (1,5)$.

5. $\int_{-1}^1 \frac{1}{x-3} dx$

at $x=3$, $\frac{1}{x-3}$ is undefined
but $3 \notin (-1,1)$
So it is NOT improper

6. $\int_0^\infty e^x dx$

It's an integration
on an unbounded interval
so it is improper

For each of the below, state whether it is a sequence or a series. If a sequence, determine whether it converges or diverges. If a series, write the first 2 terms.

7. $\sum_{n=2}^\infty \frac{3n^2 - 1}{10n + 5n^2}$

Series

n	2	3
	11	26
	40	75

 $\frac{11}{40}$ $\frac{26}{75}$
 $\frac{11}{40} + \frac{26}{75}$

8. $\left\{ \frac{e^n}{n} \right\}_{n=1}^\infty$

sequence of $\left(\frac{\infty}{\infty}\right)$ -form
as $n \rightarrow \infty$
by L' we have
 $\lim_{n \rightarrow \infty} \frac{e^n}{n} = \lim_{n \rightarrow \infty} e^n = \infty$

Divergent

9. $\sum_{n=1}^\infty \frac{1}{n}$

Series

n	1	2
	1	1/2

 $1 + \frac{1}{2} = \frac{3}{2}$

10. $\left\{ \frac{1}{n} \right\}_{n=1}^\infty$

Sequence
 $\frac{1}{n} \rightarrow 0$ as $n \rightarrow \infty$
convergent