Math 1432

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Office Hours:

Mondays 1-2pm,
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(also available by appointment)

Class webpage:

http://www.math.uh.edu/~bekki/Math1432.html

Test 4 Review

- Exam covers sections 9.3-10.3
- Be able to tell quickly if a series converges or diverges and be able to justify your answer
- Absolute vs. conditional convergence
- Intervals of convergence
- Derivatives and integrals of power series
- Taylor polynomials and Taylor series (including remainders)
- Conversion from rectangular form to polar form (and vice versa)
- Polar graphing
- Polar area
- Polar arc length
- Parametric curves

Converge or diverge?

a. $$\sum_{n=2}^{\infty} \frac{4n^2+5n-2}{n^5-3n-1}$$

b. $$\sum_{n=1}^{\infty} \frac{5n^2+3n-2}{\sqrt{2n^6+n-10}}$$

c. $$\sum_{n=1}^{\infty} \left(\frac{2}{3}\right)^{-n}$$

d. $$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n(n+1)}}$$

e. $\sum_{n=1}^{\infty}\left(\frac{3}{2}\right)^{-n}$

f. $\sum_{n=1}^{\infty}\frac{n}{\sqrt{n^3+2n}}$

g. $\sum_{n=0}^{\infty}\frac{2}{7^n}$

h. $\sum_{n=1}^{\infty}\frac{(-1)^n}{n^2}$

i. $\displaystyle\sum_{n=1}^{\infty}\left(\frac{1}{n}-\frac{1}{n+1}\right)$

j. $\displaystyle\sum_{n=1}^{\infty}\frac{5}{2n-1}$

k. $\displaystyle\sum_{n=1}^{\infty}\frac{3^{2n}}{n!}$

l. $\displaystyle\sum_{n=1}^{\infty}\left(\frac{2n}{5n-1}\right)^{n}$

m. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1} n^2}{3n^3 + 1}$

n. $\displaystyle\sum_{n=0}^{\infty} 3\left(-\frac{5}{2}\right)^n$

o. $\displaystyle\sum_{n=1}^{\infty} n\left(\frac{5}{6}\right)^n$

p. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{1+e^{-n}}$

q. $\sum_{n=1}^{\infty} \frac{5^n}{n^3}$

r. $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)}$

s. $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$

t. $\sum_{n=1}^{\infty} ne^{-n^3}$

u. $$\sum_{n=1}^{\infty}\left(\frac{n}{n+1}\right)^{n}$$

v. $$\sum_{n=1}^{\infty}\frac{1}{n(n+1)(n+2)}$$

w. $$\sum_{n=1}^{\infty}\frac{n!}{e^{n}}$$

Converge absolutely or conditionally or diverge?

a. $$\sum_{n=2}^{\infty} \frac{(-1)^n n!}{n^n}$$

b. $$\sum_{n=2}^{\infty} \frac{25n!}{(n+3)!}$$

c. $$\sum_{n=2}^{\infty} \frac{(-1)^n n!}{n(n+1)!}$$

d. $$\sum_{n=2}^{\infty} \frac{(-1)^n (n-1)}{5n^2+2n-1}$$

e. $$\sum_{n=2}^{\infty} \frac{\cos(\pi n)}{n+7}$$

f. $$\sum_{n=2}^{\infty} \frac{(-1)^n 2^n}{2^n+1}$$

g. $$\sum_{n=2}^{\infty} n(2)^n$$

Find the 5th degree Taylor polynomials centered at 0 for the following:

a) $f(x) = e^{5x^2}$

b) $f(x) = \cos\left(2x^3\right)$

c) the function with the following properties:

$f(0)$	$f'(0)$	$f''(0)$	$f'''(0)$	$f^{(4)}(0)$	$f^{(5)}(0)$
-1	3	12	-6	5	-10

Assume that $|f^{(n)}(x)| \leq 10$ for all x in the interval (0, 1). If you estimated $f(0.1)$ using a 5th degree Taylor polynomial, what is the maximum possible error?

For this same function, what is the smallest value of n for which $P_n(0.1)$ will approximate $f(0.1)$ within 0.0001?

Find the radius of convergence and interval of convergence for the following Power series:

a. $\sum_{n=0}^{\infty} \frac{3^n (x-1)^n}{n!}$

b. $\sum \frac{(-1)^k}{k^2 2^k} (x+3)^k$

Give the derivative of each power series below, and give the antiderivative F of the power series so that F(0)=0.

a. $\sum_{n=0}^{\infty} \frac{x^n}{n+2}$

b. $\sum_{n=0}^{\infty} \frac{n^2 x^n}{2n^3+1}$

Write the following in polar coordinate form:

a. $x^2 + (y+3)^2 = 9$

b. $y = \frac{1}{3}x$

Write the following in rectangular coordinate form:

a. $r = 3\cos\theta$

b. $r = 5$

Find the area inside the inner loop for $r = 3 - 6\cos\theta$

Find the area inside $r = 2$ and outside $r = 4\cos\theta$

Find the length of the curve $r = 1 + \cos\theta$

Find a parameterization for the ellipse $\frac{(x-1)^2}{4}+\frac{(y+2)^2}{9}=1$.