

Review Sections at UTLC

Final Exam Review for M408D

November 29 - December 2

Mon/Tue/Wed/Thur

5:00 - 6:15 p.m.

Students will need to come to the UTLC, Mon-Fri, 9-5 to sign up.

Review Questions

Indeterminate forms, L'Hospital's rule, and Improper Integrals

What is L'Hospital's rule and when can you apply it?

What are each of the indeterminate forms? And what does it mean to be in an indeterminate form?

What is $\int_3^5 \frac{x}{x^2-16}$? Why is that an improper integral? What is a more common improper integral?

Series

Name several series that converge and several that diverge.

What is conditional convergence? How about absolute divergence?

Why does the series $\sum_{i=1}^{\infty} \frac{1}{n}$ diverge? Why does $\sum_{i=1}^{\infty} \frac{1}{n^2}$ converge?

What are the test one can use to see if a series converges or diverges? (When are these tests inconclusive?) Why can't the comparison test be used for showing that $\sum_{i=1}^{\infty} \frac{n}{n^2+5}$ diverges? What test(s) can we use? (Chapter 12.7)

is a good review if you feel shaky.)

What is a power series? What is a Taylor Series? What is a radius of convergence?

Parametric Coordinates

How do you graph $x(t) = t^2, y(t) = t - 1$?

What is arc length? How is it computed?

Give an example of something that is a parametric function that could not be written in the form $y = f(x)$?

Polar Coordinates

How do you graph $r(\theta) = 5 + 3 \sin 4\theta$? What's the range? When is $r=0$? When is r maximal? Does this graph have any symmetry?

Math in 3-D with Vectors

What is the distance form in 3-D?

How do you add two vectors? Subtract two vectors?

What is a scalar? How is this different from a vector?

What's a dot product? What's a cross product? And what does each represent?

What's normal vector to a plane? How does this fit into the equation of a plane?

What's the equation for a line look like?

What are vector valued functions? How do get tangent vectors for these functions?

Practice Exam

Old Stuff

1 Compute the following limits:

a) $\lim_{n \rightarrow \infty} \frac{\cos n}{n^2}$

b) $\lim_{x \rightarrow 0} \frac{\sin x}{x}$

c) $\lim_{x \rightarrow 1^+} \frac{\ln x^2}{x-1}$

d) $\lim_{n \rightarrow \infty} \left(\frac{n}{n+1} \right)^{2n}$

e) $\int_1^{\infty} \frac{1}{x \ln x} dx$

2 Which converge? Which diverge? Provide some reasoning and describe convergence if it occurs.

a) $\sum_{n=4}^{\infty} \frac{1}{(\ln x - 3)^5}$

b) $\sum_{n=1}^{\infty} \frac{n^2 - n + 1999}{n^4 + 5!n^3 + n - 10}$

c) $\sum_{n=1}^{\infty} \frac{a}{r^n}$ where $r = 1/2, -1, 5$

New Stuff

3 $f(x, y) = -xye^{-x^2-y^2}$ (Picture on p. 932)

a) What are the critical points for $f(x, y)$?

b) What type of critical points are each?

c) What are the global mins and maxs for this function?

4 One leg of a right triangle is increasing at a rate of $1/3$ m/s while the other is decreasing at a rate of $1/10$ m/s. If the first leg is 10 and the second

leg is 20 what rate is the area changing?

5 A fish is swimming upward along a spiral $f(t) = \langle -\sin(\frac{\pi t}{10}), \cos(\frac{\pi t}{10}), 2t \rangle$. The temperature is given by $g(x, y, z) = x^2 + xy + z^3 + 10z^2$.

- a) What is the temperature when the fish is at height 10?
- b) What is the direction the fish is going in at height 10?
- c) At what rate is the temperature changing at this point in the direction the fish is going?