Math 120 Spring 98

Quiz 7

Basic Calculus 2

Name: _____

Date: _____ **Friday April 3, 1998**
Time Begun: _____ Ron Buckmire
Time Ended: _____

Topic covered: Determining Convergence / Divergence of Improper Integrals by Comparison

The idea behind this quiz is to give you more practice determining whether a particular improper integral will converge or diverge without evaluating it, but by comparing it to an improper integral you already know something about.

Instructions:

1. Once you open the quiz, you have 90 minutes to complete it.
2. You may use the book or any of your class notes, and you may use a calculator. You must work alone.
3. If you use your own paper, please staple it to the quiz before coming to class. If you don't have a stapler, buy one.
4. After completing the quiz, sign the pledge below stating on your honor that you have adhered to these rules.
5. Relax and enjoy...
6. **This quiz is due on Monday, April 6**, in class. NO LATE QUIZZES WILL BE ACCEPTED.

Pledge: I, _____, pledge my honor as a human being and Occidental student, that I have followed all the rules above to the letter and in spirit.

Math 120 Spring 1998 **SHOW ALL YOUR WORK** Quiz **7**

Consider the function $f(z) = \dfrac{1}{\sqrt{z}+z} = \dfrac{1}{z^{1/2}+z}$. We want to try and determine whether $I = \displaystyle\int_1^\infty \frac{1}{\sqrt{z}+z}dz$ and $J = \displaystyle\int_0^1 \frac{1}{\sqrt{z}+z}dz$ converge or diverge.

(a) (*4 points*) Use the rules developed in class to say whether each of the following integrals **converges** or **diverges**:

$\displaystyle\int_0^1 \frac{dz}{2\sqrt{z}}$ $\displaystyle\int_1^\infty \frac{dz}{2\sqrt{z}}$ $\displaystyle\int_0^1 \frac{dz}{2z}$ $\displaystyle\int_1^\infty \frac{dz}{2z}$

(b) (*1 point*) For $z > 1$ is $\dfrac{1}{\sqrt{z}+z} > \dfrac{1}{z+z}$ **or** $\dfrac{1}{\sqrt{z}+z} < \dfrac{1}{z+z}$?

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(c) (*2 points*) Does $I = \displaystyle\int_1^\infty \frac{dz}{\sqrt{z}+z}$ **converge** or **diverge**? Support your answer by explaining how the inequalities in part (b) and your answers to part (a) allow you to determine whether I converges or diverges without actually evaluating it. If you like, you can use a graph to support your explanation.

(d) (*1 point*) For $0 < z < 1$ is $\dfrac{1}{\sqrt{z}+z} > \dfrac{1}{z}$ **or** $\dfrac{1}{\sqrt{z}+z} < \dfrac{1}{z}$?

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(e) (*2 points*) Does $J = \displaystyle\int_0^1 \frac{dz}{\sqrt{z}+z}$ **converge** or **diverge**? Support your answer by explaining how the inequalities in part (d) and your answers to part (a) allow you to determine whether I converges or diverges without actually evaluating it. If you like, you can use a graph to support your explanation.