Mth 306 Quiz | Name: ID:

Bent Petersen `306w2005-test.tex` Wed May 4 2005 Time: 50 minutes.

Instructions: $\Longrightarrow$
If you do not read the instructions, then how will you know what to do? Read them now.

Be sure to enter all required information on the scantron and on this test.

Section Number: 001
Form Number: 001

- *This test is a multiple-choice test. You must turn in both the test and the scantron. Your name must be on the scantron and on the test.*
- *You must mark your answer on the provided scantron. Fill in the appropriate bubbles on the scantron very carefully.*
- *You may use one 8.5×11 inch note sheet prepared in advance. You may write on both sides of your note sheet.*
- *Note sheets may not be shared. If you do not bring a note sheet you will have to do without any help notes.*
- *You may not use any books, notebooks, additional note sheets nor note cards.*
- *You are expected to have a simple scientific calculator available for use on this test. Calculators and other equipment may not be shared.*
- *You may use a simple graphics calculator but not a laptop computer nor any device capable of extensive symbolic manipulation (other than your own brain).*
- *There are 10 multiple-choice problems worth 8 points each.*

Important Notes:

- Note that $\log(x)$ means the *natural logarithm* of x, sometimes denoted by $\ln(x)$. The logarithm with base 10 will be denoted by $\log_{10}(x)$, the logarithm with base 2 will be denoted by $\log_2(x)$, and so on.
- If you are taking this test in the Mathematics Learning Center you will not need a scantron. Just be sure to write the letters corresponding to your answers in the boxes provided below.

Problem 1. Find a real number x such that

$$\sum_{n=1}^{\infty} x^n = \frac{4}{11}.$$

A.) $7/11$ **B.)** $4/15$

C.) $-7/4$ **D.)** No such x exists. **E.)** None of the foregoing.

[ ] *←Write letter corresponding to your answer here and mark it on the scantron (Problem 1).*

Problem 2. Find a real number x such that

$$\sum_{n=0}^{\infty} x^n = \frac{4}{11}.$$

A.) $7/11$ **B.)** $4/15$

C.) $-7/4$ **D.)** No such x exists. **E.)** None of the foregoing.

[ ] *←Write letter corresponding to your answer here and mark it on the scantron (Problem 2).*

Problem 3. The series

$$\sum_{n=3}^{\infty} \frac{1}{n(\log(n))^{5/4}}$$

A.) converges by the ratio test **B.)** diverges by the ratio test

C.) converges by the integral test **D.)** diverges by the integral test **E.)** None of the foregoing.

[ ] *←Write letter corresponding to your answer here and mark it on the scantron (Problem 3).*

Problem 4. Suppose

$$\lim_{n\to\infty} n\,a_n\,\log n = 3.$$

Note that $a_n > 0$ for large n. What can we say about the series $\sum_{n=2}^{\infty} a_n$.

A.) Converges by limit comparison **B.)** Diverges by limit comparison

C.) Convergent alternating series **D.)** Divergent alternating series **E.)** None of the foregoing.

☐ ←*Write letter corresponding to your answer here and mark it on the scantron (Problem 4).*

Problem 5. The series

$$\sum_{n=1}^{\infty} (-1)^n\,\frac{3^n 5^n}{4^{2n}}.$$

A.) Absolutely convergent geometric series **B.)** Divergent geometric series

C.) Diverges by integral test **D.)** All tests fail **E.)** None of the foregoing.

☐ ←*Write letter corresponding to your answer here and mark it on the scantron (Problem 5).*

Problem 6. The series

$$\sum_{n=0}^{\infty} \frac{(3n+2)^n}{(4n+3)^n}$$

A.) converges absolutely by root test **B.)** diverges by root test

C.) diverges by integral test **D.)** All tests fail **E.)** None of the foregoing.

☐ ←*Write letter corresponding to your answer here and mark it on the scantron (Problem 6).*

Problem 7. Find the radius of convergence of the power series

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

A.) 0 **B.)** $1/27$

C.) 1 **D.)** 27 **E.)** None of the foregoing.

☐ ←*Write letter corresponding to your answer here and mark it on the scantron (Problem 7).*

Problem 8. Find the radius of convergence of the power series

$$\sum_{n=0}^{\infty} \frac{n!}{n^n}\,x^n.$$

A.) 0 **B.)** $1/e$

C.) 1 **D.)** e **E.)** None of the foregoing.

☐ ←*Write letter corresponding to your answer here and mark it on the scantron (Problem 8).*

Problem 9. A calculation in our text shows that

$$\sum_{n=1}^{\infty} n^2 z^n = \frac{z^2+z}{(1-z)^3}, \quad \text{for } |z| < 1.$$

Use this result to compute

$$\sum_{n=1}^{\infty} n^3 z^n$$

for $|z| < 1$.

A.) $(z^2+4z+1)/(1-z)^4$ **B.)** $z(z^2+4z+1)/(1-z)^4$

C.) $(z^2+z)/(1-z)^4$ **D.)** $z(z^2+4z+1)/(1-z)^3$ **E.)** None of the foregoing.

☐ ←*Write letter corresponding to your answer here and mark it on the scantron (Problem 9).*

Problem 10. Suppose we estimate $f(x)$ by its Taylor polynomial about the origin of degree 5 on the interval $\left[-\frac{1}{2}, \frac{1}{2}\right]$. If $\left| f^{(6)} \right| \leq 50$ on $\left[-\frac{1}{2}, \frac{1}{2}\right]$ find and upper bound for the absolute error in the Taylor polynomial of degree 5 approximation to $f(x)$. (Choose the smallest number that works.)

A.) 0.0007 **B.)** 0.0009

C.) 0.0011 **D.)** 0.0013 **E.)** None of the foregoing.

☐ ←*Write letter corresponding to your answer here and mark it on the scantron (Problem 10).*

Use this page and the backs of all the pages for scratch work.