

Name: \_\_\_\_\_

Math 181

Hour Exam Two

Wednesday, April 14, 2010

For every question, write your solution with computations in the exam booklet. Each part of each problem is worth a certain number of points, indicated in the right margin. There are a total of 100 points on this exam. Turn in this exam sheet with your booklet.

1a Compute the improper integral:  $\int_0^1 \frac{x^2 dx}{\sqrt{1-x^3}}$ .

1b same for  $\int_0^{+\infty} \frac{x dx}{x^4 + 1}$ .

2a Compute the arclength of the graph of  $y = 2x^{3/2}$  from  $x = 0$  to  $x = 1$ .

2a same for  $y = 2x^{3/2}$  from  $x = 2$  to  $x = 3$ .

3a Find the Maclaurin polynomial of degree 3 of the function  $f(x) = \ln(x + 1)$  centered at  $a = 0$ .

3a same for  $f(x) = xe^x$  centered at  $a = 0$ .

4a Find the sum of the series:  $\sum_{n=3}^{+\infty} \frac{3^{2n-1}}{5^{3n-2}}$ .

4b same for  $\sum_{n=3}^{+\infty} \frac{3^{2n+1}}{4^{3n-2}}$ .

4c same for  $\sum_{n=3}^{+\infty} \frac{2^{3n-1}}{3^{2n-2}}$ .

5a Determine whether the following series converge or not:

$$\sum_{n=2}^{+\infty} \frac{1}{n(\ln n)^3}, \quad \sum_{n=2}^{+\infty} \frac{n}{\sqrt{n^5 + n + 1}}.$$

**5b** Determine whether the following series converge or not:

$$\sum_{n=2}^{+\infty} \frac{\ln n}{n^3}, \quad \sum_{n=0}^{+\infty} \frac{(-1)^n}{\sqrt{n} + 10}.$$

**6a** Find the volume of the solid obtained by rotating the region below the graph of  $y = \frac{1}{x+1}$  about the  $x$ -axis for  $0 \leq x < \infty$ .

**6b** Compute the volume of the solid obtained by rotating the region below the graph of  $y = \frac{1}{x^2+1}$  about the  $x$ -axis for  $0 \leq x < \infty$ .