

MA 126 (Calculus-II)  
Show your work.

Midterm test #2  
Fri, Oct 28, 2005

1. (10 pts) Find the average value of the function  $f(x) = \sqrt{x}$  on the interval  $[0, 4]$ . Find  $c$  such that  $f_{\text{ave}} = f(c)$ .
2. (15 pts) Find the volume of the solid obtained by rotating the region  $A$  bounded by the curves  $x = 1$ ,  $x = 2$ ,  $y = 0$ ,  $y = 1/x$  about the  $x$  axis.

3. (15 pts) Find the radius of convergence and the interval of convergence for the series

$$\sum_{n=1}^{\infty} \frac{(-2)^n x^n}{\sqrt{n}}$$

(do not forget to check the endpoints).

4. (10 pts) Express the number  $3.24\overline{85}$  as a ratio of integers.
5. (10 pts) Determine if the following series converges:

$$\sum_{n=0}^{\infty} \frac{2 + \cos n}{2^n}$$

6. (15 pts) Determine if the following series converges:

$$\sum_{n=0}^{\infty} \frac{(-1)^n n^2}{n^3 + 1}$$

If it does, then does it converge absolutely?

7. (15 pts) Determine if the following series converges:

$$\sum_{n=0}^{\infty} \frac{n + 1}{\sqrt{n^5 + 10}}$$

8. (10 pts) Compute the sum of the series  $\sum_{n=1}^{\infty} [(0.1)^n + (0.5)^{n-1}]$ .

[Bonus] Let  $f(x) = kx(2 - x)$  if  $0 \leq x \leq 2$  and  $f(x) = 0$  if  $x < 0$  or  $x > 2$ .

- (a) For what values of  $k$  is  $f$  a probability density function?
- (b) For that value of  $k$  find  $P(X \geq 0.5)$ .
- (c) Find the mean.