Calculus II - Exam 2 - Fall 2007

October 25, 2007

Name:
Honor Code Statement:

Directions: Justify all answers/solutions. Calculators are not permitted. You may use the table of trigonometric identities given on the last page.

1. Evaluate each of the following integrals.

   (a) $\int x \cos x dx$

   (b) $\int_1^4 \sqrt{t} \ln t dt$

(c) $\int e^{-\theta} \cos 2\theta d\theta$

(d) $\int (1 - 2\sin(2x))^2 \, dx$

(e) $\int \sin^3 7x \, dx$ You don't need the reduction formula to do this.

(f) $\int \sin(3x)\cos(2x)\ dx$

(g) $\int \frac{\sqrt{x^2-25}}{x^4}\ dx$

(h) $\int \frac{1}{(t+4)(t-1)}\ dt$

2. Determine whether the integral is convergent or divergent. Evaluate those that are convergent.

   (a) $\int_{-\infty}^{-1} e^{-2t}\, dt$

   (b) $\int_{1}^{9} \frac{dx}{(x-9)^{1/3}}$

3. If $\sum a_n$ and $\sum b_n$ are both divergent, is $\sum(a_n + b_n)$ necessarily divergent?

4. Determine whether the given sequence is increasing, decreasing, or not monotonic. Is the sequence bounded from above? from below? Justify your answers!

$$a_n = \frac{1}{5^n}$$

Therefore by the Monotonic Sequence Theorem this sequence is . . . . . .

5. Determine whether the series is convergent or divergent. If it is convergent find its sum.

   (i) $1 + 0.4 + 0.16 + 0.064 + ...$

   (ii) $\sum_{n=1}^{\infty} \frac{(-6)^{n-1}}{5^{n-1}}$

6. Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{7n - n^{1/3}}{n^5}$$

7. Determine if the following series converges or diverges.

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

8. Find all values of c for which the following series converges.

$$\sum_{n=1}^{\infty}(\frac{c}{n}-\frac{1}{n+1})$$