

Math 126: Practice Problems for the Final

Take these along with the old exams as your practice set for the final. These are the types of questions that you are likely to see. We'll discuss the exact contents of the exam on Tuesday and Wednesday.

1. Consider the area bound by the y -axis, the line $y = 5$, and the curve $y = x^2 + 1$.
 - (a) (10 points) Set up integrals to find this area using both horizontal and vertical divisions. Solve both integrals and check that your answers are the same.
 - (b) (10 points) Set up, but do not compute, the integrals for the volumes obtained by revolving this area about the y -axis and about the x -axis. You may do this using whatever method you feel is easiest.

2. (10 points) Determine

$$\int (x + 1) \cos(x^2 + 2x) dx$$

3. (20 points) Do any 2 of the following 4 integrals. Do ONLY two of the integrals, and please indicate which two you intend for me to grade.

(a)

$$\int x^4 \cos x^3 dx$$

(b)

$$\int \frac{2x}{x^2 + 3x - 10} dx$$

(c)

$$\int \frac{t^2 - 1}{t^2 + 1} dt$$

(d)

$$\int \sec^4(x) \tan^4(x) dx$$

4. (15 points) Determine if

$$\int_2^{\infty} \frac{1}{\sqrt{x}(1+x)}$$

is convergent or divergent. If you decide it's convergent, to what does it converge? (Hint: Look for a substitution).

5. (20 points) For 2 of the following 4 series, determine if they converge absolutely, converge conditionally, or diverge.

$$\sum_{n=1}^{\infty} \frac{4^n}{5^n + n^5} \quad \sum_{n=1}^{\infty} \frac{(-1)^n(n+1)}{2n^3 + 1} \quad \sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n} \quad \sum_{n=1}^{\infty} \frac{n^2 2^n}{n!}$$

6. (10 points) Determine the values of x for which

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

converges. Be sure to check endpoints.

7. (10 points) Determine $\int \frac{\sin(t)}{t} dt$ using series (show enough terms to establish a pattern). Is your function even or odd? Explain.
8. (15 points) The formula for the temperature (in degrees F) of a corpse is given by

$$H(t) = 68 + 30.6e^{-.4t}$$

A woman claims 'The man was dead when I got here, four hours ago.' If the body temperature is 77 degrees Fahrenheit, is the woman correct? If you determine she is wrong, figure out when the murder occurred.