

Math 102, Fall 2021 — Exam 2 notes

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Exam 2 on November 19

Remarks

Your exam in class on November 19 will contain about 6 problems, some with multiple parts. It will cover sections 9.5, 7.1, 7.2, 7.4, 7.6, and the basics of integration we discussed before starting chapter 7. The topics are power series, basics of integration and areas, substitution, integration by parts, partial fractions, and improper integrals. The problems will all be similar to homework. While old worksheets, lecture problems, and homework problems all give lots of examples (try them without looking at solutions), there are also problems in our textbook, with answers to odd-numbered problems in the back. No notes will be allowed on the exam, but you can use a scientific calculator with no graphing functionality.

The sample problems below give you some practice of the main topics, but make sure to study old problems to get a complete overview.

Sample problems

1. Find the interval of convergence of the following power series.

(a) $\sum_{n=1}^{\infty} (-1)^n \frac{x^n}{n^2 5^n}$

(b) $\sum_{n=1}^{\infty} \frac{(x+2)^n}{n 4^n}$

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

2. Sketch the region enclosed by the given curves and then find the unsigned area of the region.

(a) $y = (x-2)^2$, $y = x$

(b) $y = x^2 - 2x$, $y = x + 4$

3. Evaluate the following integrals

(a) $\int \frac{dx}{5-3x}$

(b) $\int \frac{(\ln x)^2}{x} dx$

(c) $\int x(2x^2 + 5)^8 dx$

(d) $\int \sqrt{x} \sin(1 + x^{3/2}) dx$

$$(e) \int_1^2 \frac{e^{1/x}}{x^2} dx$$

4. Evaluate the following integrals

$$(a) \int x \cos 5x dx$$

$$(b) \int_1^e x^3 \ln x dx$$

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

5. Evaluate the following integrals.

$$(a) \int \frac{x^2 + x + 1}{x^3 + x^2 - 2x} dx$$

$$(b) \int \frac{10}{(x-1)(x^2+9)} dx$$

$$(c) \int \frac{x^2 - 5x + 16}{(2x+1)(x-2)^2} dx$$

6. Evaluate the following improper integrals or show that they diverge.

$$(a) \int_3^\infty \frac{1}{2(x+5)^2} dx$$

$$(b) \int_{-1}^4 \frac{1}{(x+1)^{1/3}} dx$$

$$(c) \int_{-3}^3 \frac{1}{x^{2/3}} dx$$

$$(d) \int_0^\infty \frac{1}{(x-1)^3} dx$$