

Math 1B

Midterm 3 Review

For sections 5.4–5.5 and 7.1–7.5:

Get together a group of classmates.

Make a copy of the following pages and integrals:

p397	5-42	p457	3-42	p481	7-38, 47-52
p406	7-70	p465	1-42, 46-49, 51-52	p488	1-75 ODD
p410	9-36	p472	4-30	p518	1-39 ODD

Cut them up, so each question is on a separate slip of paper.

Throw them in a pile and mix them up.

One at a time, randomly pick out a question from the pile and everyone solve it independently.

Compare solutions and discuss which one is fastest/easiest, and how you can recognize what method to use.

The following questions act as a review for 7.7 and 7.8.

[1] Determine if the following integrals converge or diverge. If an integral converges, find its value.

[a] $\int_0^{\infty} x^2 e^{-3x} dx$

[b] $\int_0^{\infty} \frac{1}{\sqrt[3]{x-1}} dx$

[c] $\int_{-\infty}^{\infty} \frac{1}{x^2 + 4} dx$

[d] $\int_{-\infty}^{\infty} \frac{x}{x^2 + 4} dx$

[e] $\int_{-\infty}^0 \frac{e^x}{1 + e^x} dx$

[f] $\int_0^2 \frac{1}{\sqrt{4-x^2}} dx$

[g] $\int_0^2 \frac{x}{\sqrt{4-x^2}} dx$

[h] $\int_0^1 \frac{1}{x(\ln x)^2} dx$

[i] $\int_0^{\pi} \tan x dx$

[2] Determine if the following integrals converge or diverge. Justify your answer.

[a] $\int_1^{\infty} \frac{2 + \sin x}{x} dx$

[b] $\int_1^{\infty} \frac{2 + \sin x}{x^2} dx$

[c] $\int_0^{\infty} e^{-x^2} dx$

[d] $\int_e^{\infty} \frac{1}{\ln x} dx$

[e] $\int_e^{\infty} \frac{1}{x \ln x} dx$

[f] $\int_2^{\infty} \frac{x+1}{\sqrt{x^4-1}} dx$

[g] $\int_1^{\infty} \frac{\cos^2 x}{xe^x} dx$

[3] Estimate $\int_1^9 f(x) dx$ using $n = 4$ and each of the methods below.

x	0	1	2	3	4	5	6	7	8	9	10
$f(x)$	7	9	10	13	12	10	7	3	2	2	5

[a] Midpoint Rule

[b] Trapezoidal Rule

[c] Simpson's Rule

[4] Find [i] the percentage error [ii] bounds on the error

when each of the following rules are used to approximate $\int_1^8 \frac{4}{\sqrt[3]{x}} dx$ with $n = 10$.

[a] Midpoint Rule

[b] Trapezoidal Rule

[c] Simpson's Rule