

Math 76 Practice Problems for Midterm I

§§6.1-6.3

DISCLAIMER. This collection of practice problems is *not* guaranteed to be identical, in length or content, to the actual exam. You may expect to see problems on the test that are not exactly like problems you have seen before.

On the actual exam you will have more room to work the problems. You will see directions similar to these:

1. Please read directions carefully. Raise your hand if you are not sure what a problem is asking.
2. *You must explain your work thoroughly and unambiguously to receive full credit on questions or parts of questions designated as **Work and Answer**.*
3. **No calculators or notes are allowed on this exam. All electronic devices must be stowed and silent.**
4. You have 65 minutes to complete your test, unless announced otherwise. Do not spend too long on any one problem. You do not have to do the problems in order. Do the easy ones first. Do not attempt the bonus question until you have completed the rest of the test. Before turning in your test, please make sure you have answered and double-checked all the questions.
5. If you need scratch paper, please raise your hand. You may not use your own paper. When you have finished your exam, please turn in any scratch paper you use.
6. Write your solutions in the space provided for each problem, or provide specific instructions as to where your work is to be found. *Make it clear what you want and don't want graded.* Your final answers should be boxed or circled.
7. Unless directed otherwise, only EXACT ANSWERS will receive full credit (i.e. $\sqrt{2}$, not 1.414).
8. In word problems, give units on all answers (e.g. feet, grams, gallons).
9. Don't stress! I'm rooting for you!

You will also be provided with the following information:

$\sin^2 x + \cos^2 x = 1$	$\sin x \cos x = \frac{1}{2} \sin 2x$
$\tan^2 x + 1 = \sec^2 x$	$\sin A \cos B = \frac{1}{2} [\sin(A - B) + \sin(A + B)]$
$\sin^2 x = \frac{1}{2}(1 - \cos 2x)$	$\sin A \sin B = \frac{1}{2} [\cos(A - B) - \cos(A + B)]$
$\cos^2 x = \frac{1}{2}(1 + \cos 2x)$	$\cos A \cos B = \frac{1}{2} [\cos(A - B) + \cos(A + B)]$

Multiple Choice. *Circle the letter of the best answer.*

1. $\int_0^1 xe^x dx =$

(a) 1

(c) $e - 1$

(b) e

(d) 0

2. $\int_{-\pi/4}^{\pi/4} \tan^2 x \, dx =$

(a) $1 + \frac{\pi}{2}$

(c) $2 - \frac{\pi}{2}$

(b) $1 - \frac{\pi}{4}$

(d) $2 + \frac{\pi}{4}$

3. The partial fraction decomposition of $\frac{4x^3 - 2x + 1}{(x^2 + 5)(x - 3)^2}$ is

(a) $\frac{A}{x^2 + 5} + \frac{B}{x - 3} + \frac{C}{(x - 3)^2}$

(c) $\frac{Ax + B}{x^2 + 5} + \frac{C}{(x - 3)^2}$

(b) $\frac{Ax + B}{x^2 + 5} + \frac{C}{x - 3} + \frac{D}{(x - 3)^2}$

(d) $\frac{Ax + B}{x^2 + 5} + \frac{C}{x - 3} + \frac{Dx + E}{(x - 3)^2}$

4. $\int \frac{2x - 1}{(x + 1)(x - 2)} \, dx =$

(a) $\ln|x + 1| + \ln|x - 2| + C$

(c) $\ln|x + 1| - \ln|x - 2| + C$

(b) $3 \ln|x + 1| - 2 \ln|x - 2| + C$

(d) $-\ln|x + 1| + \ln|x - 2| + C$

5. $\int \frac{7}{x^2 + 6x + 10} \, dx =$

(a) $\tan^{-1}\left(x + \frac{3}{7}\right) + C$

(c) $\frac{7}{3} \tan^{-1} x + C$

(b) $7 \tan^{-1}(6x + 10) + C$

(d) $7 \tan^{-1}(x + 3) + C$

Fill-In.

1. $\int \sec^3 x \, dx =$ _____ .

2. $\int \sin^3 x \, dx =$ _____ .

3. To evaluate the integral $\int \sqrt{5 + x^2} \, dx$, it is best to use the trigonometric substitution

$x =$ _____ .
(function of θ)

4. If $\frac{x^2 - 3}{(x^2 + 1)(x - 2)} = \frac{Ax + B}{x^2 + 1} + \frac{C}{x - 2}$, then

(a) $A =$ _____

(b) $B =$ _____

(c) $C =$ _____

Work and Answer. *You must show all relevant work to receive full credit.*

1. Evaluate the integral $\int x \sin 3x \, dx$.

2. Evaluate the integral $\int x \sin^{-1}(x^2) \, dx$.

3. Evaluate the integral $\int e^x \sin x \, dx$.

4. Evaluate the integral $\int x^2 \ln(x^3) \, dx$.

5. Evaluate the integral $\int \cos^2 x \sin^4 x \, dx$.

6. Evaluate the integral $\int \tan^2 x \sec^4 x \, dx$.

7. Evaluate the integral $\int \tan^3 x \sec^3 x \, dx$.

8. Evaluate the integral $\int \tan^2 x \sec x \, dx$.

9. Evaluate the integral $\int \cos 2x \sin 3x \, dx$.

10. Evaluate the integral $\int \sqrt{4 - 9x^2} \, dx$.

11. Evaluate the integral $\int \sqrt{4 + 9x^2} \, dx$.

12. Evaluate the integral $\int \sqrt{9x^2 - 4} \, dx$.

13. Evaluate the integral $\int \frac{2x^2 - 5x + 10}{(x - 1)^3} \, dx$.

14. Evaluate the integral $\int \frac{x^2 - 9x - 7}{(x + 2)(x^2 + 1)} \, dx$.

Some kind of **BONUS**.