Math 102 — Exam 2 review

Your exam in class on November 11 will contain about 6 problems, some with multiple parts. It will cover material from Homework 4 to Homework 7. The problems below give you a sampling of some similar problems, but it's not necessarily comprehensive, so make sure to review old homework, worksheets, and lecture notes. 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.

Problem 1. Evaluate the following integrals.

a. $\displaystyle\int \frac{dx}{5-3x}$

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

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

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

e. $\displaystyle\int_1^2 \frac{e^{1/x}}{x^2}\,dx$

Problem 2. Evaluate the following integrals

a. $\displaystyle\int x\cos 5x\,dx$

b. $\displaystyle\int_1^e x^3\ln x\,dx$

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

Problem 3. Evaluate the following integrals.

a. $\displaystyle\int \frac{x^2+x+1}{x^3+x^2-2x}\,dx$

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

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

Problem 4. 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. $\int_0^\infty \frac{1}{(x-1)^4}\,dx$

Problem 5. Sketch the region enclosed by the given curves and then set up integrals for the unsigned area of the region in two ways: with respect to x and with respect to y.

a. $y=(x-2)^2, \quad y=x$

b. $y=(x-1)^2-1, \quad y=x+4$

Problem 6. Sketch the region bounded by the given curves and then set up integrals to find the volume obtained by rotating the region about the given axis. Do this in two ways: using the disk/washer method and using the shell method.

a. $y=x^2, \quad y=9, \quad x=0;$ about the x-axis

b. $y=\sqrt{x}, \quad y=0, \quad x=1;$ about $x=-1$

c. $y=x^3, \quad y=0, \quad x=2;$ about $y=-2$

d. $y=\ln x, \quad y=1, \quad y=2, \quad x=0;$ about the y-axis