

Math 10B
Final Examination
March 19, 2013
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Version A

Instructions

1. No calculators or other electronic devices are allowed during this exam.
2. You may use one page of notes, but no books or other assistance during this exam.
3. Write your *Name*, *PID*, and *Section* on the front of your Blue Book.
4. Write the *Version* of your exam at the top of the page on the front of your Blue Book.
5. Write your solutions clearly in your Blue Book
 - (a) Carefully indicate the number and letter of each question and question part.
 - (b) Present your answers in the same order they appear in the exam.
 - (c) Start each question on a new side of a page.
6. Read each question carefully, and answer each question completely.
7. Show all of your work; no credit will be given for unsupported answers.

0. (2 points) Carefully read and complete the instructions at the top of this exam sheet and any additional instructions written on the chalkboard during the exam.

1. (6 points) Let f be an *even* function such that the average value of f on $[-3, 3]$ is 10. Find $\int_0^3 f(x) dx$.

2. (6 points) Write down a definite integral which gives the volume of a sphere of radius 2, and then evaluate it. Be sure to include a sketch that explains how you arrived at your integral.

3. (6 points) Evaluate $\int \frac{[\ln(x) + 5]^2}{x} dx$.

4. (6 points) Evaluate $\int_0^1 x e^{-5x} dx$.

5. (6 points) Evaluate the improper integral $\int_{-20}^5 \frac{1}{\sqrt{t+20}} dt$.

6. (6 points) Determine whether or not the following improper integral converges: $\int_0^{\infty} \frac{e^{-x}}{x+1} dx$.

7. (6 points) Find the general solution to the differential equation $\frac{dy}{dt} = 2y(y+2)$.

Note: Problem 8 is on the other side of this page.

8. (6 points) John owns a retirement account that earns 10% annual interest, compounded continuously. He withdraws money from the account at a continuous rate of \$1200 per year.
- (a) Write a differential equation that describes the rate at which the balance $B = B(t)$ is changing.
 - (b) John's initial deposit is \$11,000. How long will it take for the balance in John's retirement account to reach \$0?