Math 104 Homework Practice Midterm 2

Name (printed):

TA:

Recitation Time:

Please *turn off all electronic devices*. You may use both sides of a 8.5×11 sheet of paper for notes while you take this exam. No calculators, no course notes, no books, no help from your neighbors. **Show all work**, even on multiple choice or short answer questions—the grading will be based on your work shown as well as the end result. Please **clearly mark** a multiple choice option for each problem. Remember to put your name at the top of this page. Good luck.

My signature below certifies that I have complied with the University of Pennsylvania's *code of academic integrity* in completing this examination.

Your signature

Problem	**Score (out of)**
1	(10)
2	(10)
3	(10)
4	(10)
5	(10)
6	(10)
7	(10)
8	(10)
Total	(80)

1. (10 pts) Find the length of the curve $y = \int_0^x \sqrt{cos(2t)}dx$ from $x = 0$ to $x = \frac{\pi}{4}$.

2. (10 pts) Find the surface area of the portion of the sphere of radius R that lies between the planes $z = a$ and $z = b$ where $-R < a < b < R$.

3. (10 pts) Find the centroid of the region bounded by the curves $y = \sqrt{x}$ and $y = x^2$.

4. (10 pts) Find the volume of the solid obtained by rotating the region bounded by $x = 4 - y^2$ and $y = x$ about the line $y = 2$.

5. The disk $x^2 + y^2 \leq a^2$ is revolved about the line $x = b$ (where $b > a$) to generate a solid shaped like a doughnut called a torus. Find its volume.

6. (10 pts) Find the following integrals or show they do not exist.

$$\int_{-1}^{2} x^{-\frac{3}{2}} dx$$

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7. (10 pts) Show that the following integral converges or show that it diverges.

$$\int_{e^e}^{\infty} ln(ln(x))dx$$

8. (10 pts) Show that $f(x) = \frac{1}{2}e^{-|x|}$ is a probability density function