Math 125, Sections C and F, Fall 2014, Midterm I

October 16, 2014

Name

TA/Section

Instructions.

- There are 4 questions. The exam is out of 40 points.

- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting. Hand in you note sheet with your exam.

- Calculators are NOT allowed. Put away ALL electronic devices.

- For your integrals you may use the following formulas. Anything else must be justified by your work.

$$\int x^n \ dx = \frac{x^{n+1}}{n+1} + C, n \neq -1 \qquad \int e^x \ dx = e^x + C \qquad \int \frac{1}{x} \ dx = \ln|x| + C$$

$$\int \sin x \ dx = -\cos x + C \qquad \int \cos x \ dx = \sin x + C \qquad \int \sec^2 x \ dx = \tan x + C$$

$$\int \csc x \cot x \ dx = -\csc x + C \qquad \int \sec x \tan x \ dx = \sec x + C = \qquad \int \csc^2 x \ dx = -\cot x + C$$

$$\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1} x + C \qquad \int \frac{1}{1+x^2} dx = \tan^{-1} x + C$$

- **Show your work**. If I cannot read or follow your work, I cannot grade it. You may not get full credit for a right answer if your answer is not justified by your work. If you continue at the back of a page, make a note for me.

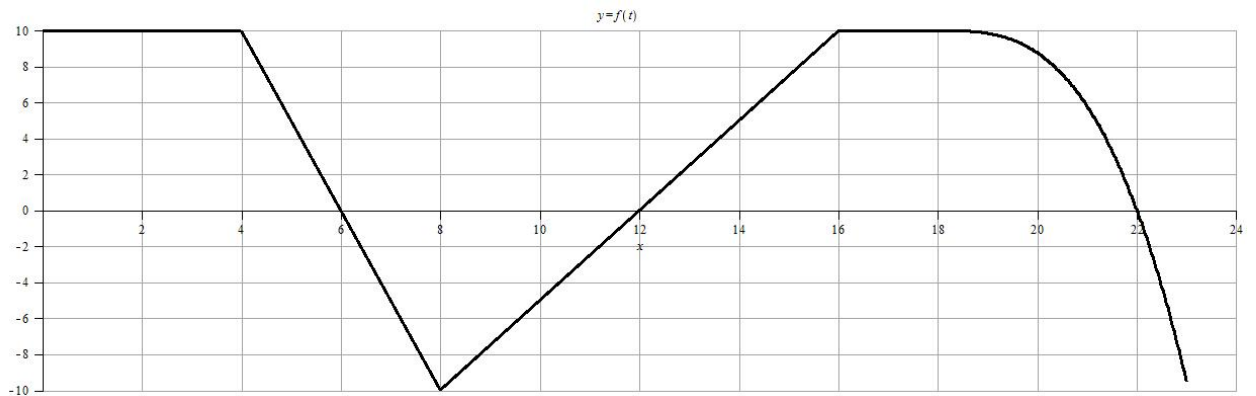| Question	points
1	
2	
3	
4	
Total	

1. Evaluate the following integrals.

   (a) (4 points) $\int 7\cos(\theta)\sin^2(\theta)d\theta$

   (b) (5 points) $\int_0^1 \dfrac{x}{1+5x}dx$

   (c) (1 point) $\int_{-1}^1 xe^{x^8}dx$

2. Define $g(x) = \int_4^x f(t)\,dt$ where the graph of $f(t)$ is given below.

$y=f(t)$

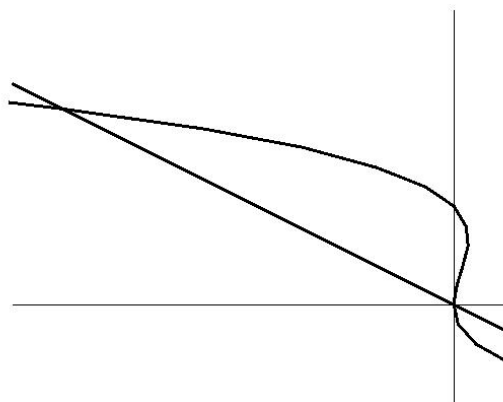(a) (5 points) Evaluate the following:

$g(0) =$

$g(4) =$

$g(16) =$

$g'(17) =$

$g''(11) =$

(b) (2 points) Express $g(22) - g(18)$ as a definite integral and estimate it with $n = 4$ and leftpoints. This question will be graded with a reasonable allowance for estimation error.

(c) (3 points) If $h(x) = \int_4^{x^3} f(t)\,dt$, what is $h'(2)$?

3

3. (9 points) Find the area of the region shown below bounded by the curve $x = -y^3 + y^2$ and the line $x = -2y$.

4. (a) (3 points) Sketch the region between the parabola $y = x^2 - 12x + 32$ and the line $y = 3x - 4$. Label all intersection points.

(b) (3 points) Set up an integral to calculate the volume of the solid formed by rotating this region about the y-axis. Do NOT integrate.

(c) (3 points) Set up an integral to calculate the volume of the solid formed by rotating this region about the horizontal line $y = 40$. Do NOT integrate.

(d) (2 points) Set up an integral to calculate the volume of the solid formed by rotating this region about the vertical line $x = 4$. Do NOT integrate. This is a bit tricky.