# Math 125, Section A, Spring 2012, Midterm II

## May 17, 2012

**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 your notes with your exam paper.**

- You may use a calculator which does not graph and which is not programmable. Even if you have a calculator, give me exact answers. ($\frac{2\ln 3}{\pi}$ is exact, 0.7 is an approximation for the same number.)

- **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. Please $\boxed{\text{BOX}}$ your final answer.

- You cxan use any of the integrals on page 495 of your table. Any other integration should be justified by your work.

| Question | points |
|:--------:|:------:|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| Total | |

1. Evaluate the following integrals.

   (a) (6 points) $\displaystyle\int \frac{x}{\sqrt{3 + 2x - x^2}} \; dx$

   (b) (6 points) $\displaystyle\int e^{\sqrt{x}} \; dx$

2. Evaluate the following integrals.

   (a) (6 points) $\displaystyle\int_1^e \frac{(\ln x)^2}{x}\ dx$

   (b) (6 points) $\displaystyle\int_1^\infty \frac{17}{6x^2 + 13x - 5}\ dx$

3. (8 points) Use Simpson's rule with $n = 6$ to estimate the length of the curve $y = x \sin x$ from $x = 0$ to $x = \pi$. Give your answer in exact form (all trig functions should be evaluated) and as a decimal.

4. (8 points) The giants are building a sandcastle for their queen. It is in the shape of a frustrum of a cone (a cone with its top cut off) whose base radius is 10 m, the top radius is 6 m and height is 15 m. Sand of density 1800 kg/m$^3$ is carried from ground level. Find the work done. The acceleration due to gravity is approximately 9.8m/s$^2$.