# Math 125 C - Winter 2005
# Mid-Term Exam Number One
## January 27, 2005

Name: _____          Section: _____

| | | |
|---|---|---|
| 1 | 10 | |
| 2 | 15 | |
| 3 | 15 | |
| 4 | 10 | |
| 5 | 10 | |
| Total | 60 | |

- Complete all questions.

- You may use a calculator, and you should have one, during this examination. Other electronic devices are not allowed, and should be turned off for the duration of the exam.

- You may use one double-sided, hand-written, 8.5 by 11 inch page of notes.

- Show all work for full credit.

- You have 70 minutes to complete the exam.

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1.  (a) Is $\dfrac{e^x}{x}$ an antiderivative of $\dfrac{e^x}{x}\left(\dfrac{1}{x^2} - 1\right)$? Explain.

    (b) Suppose $f(t) = 3g(t) - 6$ and

    $$\int_{-3}^{5} g(t)\, dt = 12.$$

    Find

    $$\int_{-3}^{5} f(x)\, dx.$$

2. Evaluate the following integrals:

(a) $\int_0^1 \left( x^5 - 3x^4 + \frac{1}{2}x^3 - x \right) dx$

(b) $\int_{-5}^5 |3 + 5t| \, dt$

(c) $\int_e^{e^2} \frac{1}{x(\ln x)^4} \, dx$

3. Evaluate the following integrals:

(a) $\int \dfrac{1 + \cos x}{\sin x + x}\, dx$

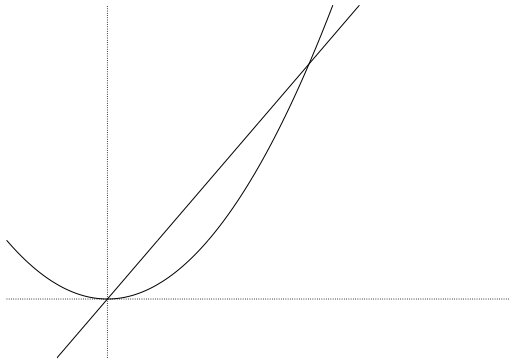(b) $\int e^x \sin\left(e^x - 3\right)\, dx$

(c) $\int \left(x^3 + x\right) \sqrt{x^2 + 1}\, dx$

4. Consider the region bounded by $y = 10 - x^2$ and $y = x^2 - 2x + 6$.

(a) Find the area of the region.

(b) Set up but DO NOT EVALUATE an integral representing the volume of the solid of revolution formed by revolving this region about the line $x = 5$.

5. A region is bounded by two curves: $y = x^2$, and a line with a positive slope passing through the origin.



(a) If the area of this region is 1, what is the slope of the line?

(b) If the volume of the solid of revolution created by revolving this region about the $x$-axis is 1, what is the slope of the line?