Math 125 D Winter 2012
Mid-Term Exam Number One
January 26, 2012

Name: _____   Student ID no. : _____

Signature: _____   Section: _____

1	15	
2	15	
3	10	
4	10	
5	10	
6	10	
Total		

- Show all work for full credit.

- You may use a scientific calculator during this examination. Graphing calculators are not allowed. Also, other electronic devices are not allowed, and should be turned off and put away for the duration of the exam.

- If you use a trial-and-error or guess-and-check method when an algebraic method is available, you will not receive full credit.

- You may use one hand-written 8.5 by 11 inch page of notes. Write your name on your notesheet and turn it in with your exam.

- You have 80 minutes to complete the exam.

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1. Evaluate the following indefinite integrals.

(a) $\displaystyle\int \frac{x^4 + x^3 \sin x^2}{x^2}\, dx$

(b) $\displaystyle\int (x^2 + 3)(x^3 + x)\, dx$

(c) $\displaystyle\int t^{13}\sqrt{2t^7 + 5}\, dt$

2. Evaluate the following definite integrals.

(a) $\displaystyle\int_0^5 |x^3 - 27| \, dx$

(b) $\displaystyle\int_{-5}^{-2} \frac{3}{2x - 6} \, dx$

(c) $\displaystyle\int_0^1 \frac{5x + 2}{x^2 + 1} \, dx$

3. Let $g(x) = \int_{-x^2}^{e^x} \ln(1 + t^2) \, dt$. Find $g'(x)$.

4. Find the area of the region bounded by the curves $y = 25 - x^2$ and $y = 2(x + 5)$.

5. On the moon, the acceleration due to gravity is 1.63 meters per second^2. Suppose you are standing on the moon and see a rock falling. At the instant you see it, the rock is 30 meters above the moon's surface. The rock hits the surface 2.3 seconds later. How fast was the rock moving when it hit the surface?

6. Let $a > 0$. Let R be the region in the first quadrant bounded by $y = x^2$, the x-axis, and the tangent line to $y = x^2$ at $x = a$.

   (a) Express the area of R as an integral or sum of integrals (your choice).

   (b) Find a so that the area of R is 100.