Math 125 G - Winter 2011
Mid-Term Exam Number Two
February 24, 2011

Name: _____

Student ID number: _____   Section: _____

1	10	
2	10	
3	10	
4	10	
5	5	
6	10	
Total	55	

- Complete all questions.

- You need a scientific calculator for this examination; graphing calculators and other electronic devices are not allowed and should be turned off and put away for the duration of the exam.

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

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

- Show all work for full credit.

- You have 80 minutes to complete the exam.

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1. Evaluate the following integrals.

(a) $\int \sin^3 x \cos^{24} x \, dx$

(b) $\int e^{4x} \cos(5x) \, dx$

2. Evaluate the following integrals.

(a) $\int \dfrac{3x^3 - x^2 - 2x - 4}{x^2 - x}\, dx$

(b) $\int \dfrac{dx}{(1 - x^2)^{3/2}}$

3. Evaluate the following integrals.

(a) $\int \dfrac{x}{(x-3)^2}\, dx$

(b) $\int \dfrac{\ln x}{\sqrt{x}}\, dx$

4. Evaluate the following integrals.

(a) $\displaystyle\int_8^\infty \frac{1}{x^2 + 3x - 10}\, dx$

(b) $\displaystyle\int_0^\infty \frac{1}{e^{2x} + e^{-2x}}\, dx$

5. Let R be the region in the first quadrant bounded by the y-axis, the x-axis, $y = \ln x$ and $y = 2$. Let S be the solid of revolution created by revolving R about the y-axis.

Suppose a tank is build in the shape of S, with dimensions in meters. The tank is filled with beer with density 1050 km/m^3.

Express the work done in pumping all of the beer up to a pipe 0.5 meters above the top of the tank as an integral. Do not evaluate the integral.

6. Consider the curve $y = \cos x$ on $0 \leq x \leq \frac{\pi}{2}$.

   (a) Express the arc length of this curve as an integral. Do not evaluate the integral.

   (b) Use Simpson's rule with $n = 4$ to numerically approximate your integral in part (a).