**Calculus I Final Exam Practice**
Spring 2014, MAT 155 Section 04LB[51293]
May 1st, 2014. 11:00AM - 12:40PM.

## Problems on Integration

1.(Sample Final 15) A particle moves along the $x$-axis with an acceleration given by $a(t) = 2t - 1$, where $t$ is measured in seconds and $s$ (position) is measured in meters. If the initial position is given by $s(0) = 3$ and the initial velocity is given by $v(0) = 4$ then find the position of the particle at $t$ seconds.

2.(Sample Final 15 variant) A particle, initially at rest, moves along the $x$-axis such that its acceleration at time $t > 0$ is given by $a(t) = \cos t$. At the time $t = 0$, its position is $x = 3$. (1) Find the velocity and position of the particle. (2) Find the values of $t$ for which the particle is at rest.

3.(Sample Final 16) Find the area under the curve $y = 12 - 3x^2$ from $x = -1$ to $x = 1$.

4.(Sample Final 16) What is the area between the curve $y = -3x^2 + 12$ and the $x$-axis from $x = 0$ to $x = 2$?

5.(Sample Final 17) Evaluate the derivative $F'(x)$ of the function $F(x)$ defined by:

$$F(x) = \int_0^x \frac{1}{1+x^3} dx$$

at $x = 1$.

6.(Sample Final 17 variant) Find $F'(x)$ for given $F(x)$:
(1) $F(x) = \int_x^{2014} t \cos t dt$ (2) $F(x) = \int_x^{2015} \frac{t^2}{t^2+1} dt$ (3) $F(x) = \int_{x+2}^{x} (x^2+1) dt$
(4) $F(x) = \int_{3x^3}^{2x^2} \cos^2 t dt$

7.(Sample Final 18.(b)) Evaluate $\int 3(8y - 1)e^{4y^2 - y} dy$.

8.(MAT176 Sample Final 1 variant) Evaluate the indefinite integrals(find the general antiderivatives), <u>and</u> check by differentiating:
(1)$\int (2x^2 - \frac{2}{x^2}) dx$ (2)$\int \frac{\cos\theta}{\sin^2\theta} d\theta$ (3)$\int \frac{1}{1-2x} dx$ (4)$\int \frac{\sin\sqrt{x}}{\sqrt{x}} dx$

9.(MAT176 Sample Final 5 variant) Evaluate the definite integrals:
(1)$\int_1^3 (9+x)^2 dx$ (2)$\int_0^1 2x\sqrt{1+x^2} dx$ (3)$\int \frac{1}{1-2x} dx$ (4)$\int_{-2}^{-4} e^{-x} dx$
(5)$\int_{\frac{\pi}{2}}^{\pi} x \cos(x) dx$

10.(MAT176 Sample Final 6) Set up an integral which equals the area of the region $R$ in the $xy$-plane bounded by the curves $y = \sqrt[3]{x}$ and $y = x^3$; do <u>not</u> evaluate the integral.