Calculus   Midterm2   Dec.12,2006

- No electronic or mechanical devices which have calculating or program-ming function.

- You will get no point if use L'ôpital's Rule to calculate limits.

1. (15%) Evaluate

$$\int_1^3 \frac{dx}{\sqrt{x}(1+x)}.$$

2. (15%) Find

$$\int (3-x)7^{(3-x)^2} dx.$$

3. (15%) Find

$$\int \frac{x^2+x+1}{x^2+1} dx.$$

4. (15%) Given

$$F(x) = \int_0^{x^2} sin\theta^2 d\theta,$$

find $F'(x)$.

5. (10%) Let f be twice-differentiable and one-to-one on an open interval I. Show that its inverse function g satisfies

$$g''(x) = -\frac{f''(g(x))}{[f'(g(x))]^3}.$$

6. (10%) Evaluate

$$\int_1^5 \frac{x}{\sqrt{2x-1}} dx.$$

7. (10%) Determine

$$\lim_{x \to} \frac{1}{n^3}[1^2 + 2^2 + 3^2 + ... + n^2]$$

by nsing an appropriate Riemann sum.

8. (10%) Use differentials to approximate the value of $(2.99)^3$.