Second Midterm, First Term Department of Mathematics

COURSE: MATH 106, DATE: 12 December, 2015

TIME DURATION: 90 min

1. **[6 Marks]**

   1.1) Evaluate the integral $\int \sin(x) \ln(\cos(x))\, dx$.   [3 Marks]

   1.2) Evaluate the integral $\int \tan^3(x) \sec^3(x)\, dx$.   [3 Marks]

2. **[6 Marks]**

   2.1) Evaluate the integral $\int \frac{1}{3-2\cos(x)}\, dx$.   [4 Marks]

   2.2) Let $f(x) = \int_1^x \frac{\sin(u)}{u}\, du$. Find $\lim_{x \to 1} \frac{f(x)}{x-1}$.   [2 Marks]

3. **[7 Marks]**

   3.1) Evaluate the integral $\int \frac{x^2}{\sqrt{1-x^2}}\, dx$, $-1 < x < 1$. [4 Marks]

   3.2) Evaluate the integral $\int \frac{6x-11}{(x-1)^2}\, dx$.   [3 Marks]

4. **[6 Marks]**

   4.1) Evaluate the integral $\int e^{2x}\sqrt{1+e^x}\, dx$.   [3 Marks]

   4.2) Sketch the region bounded by the graphs of the equations $y = 6 - 3x^2$, $y = 3x$, $x = 0$, $x = 2$ and find its area. [3 Marks]