Math 190 Quiz 4: Wednesday November 15 - 2017

The quiz is 15 minutes long and has one question. No calculators or other aids are permitted. Show all of your work for full credit.

Name: ___________________________  Student Number: ___________________________

Question:
1. Consider the following integral:
   \[ \int_{0}^{\frac{1}{2}} (2x + 1) \, dx. \]

   (a) Use the area under the curve to compute this integral.

   \[ \int_{0}^{\frac{1}{2}} (2x + 1) \, dx = \left[ \frac{1}{2} \right] (2 \cdot 0 + 1) + \left[ \frac{1}{2} \right] (2 \cdot \frac{1}{2} + 1) \]
   \[ = \frac{1}{2} + \frac{1}{4} = \frac{3}{4}. \]

   (b) Use the **Fundamental Theorem of Calculus** to compute this integral.

   It's easy to see that the anti-derivative of 2x is \( x^2 \) and the anti-derivative of 1 is \( x \). So, the anti-derivative of \( f(x) = 2x + 1 \) is \( F(x) = x^2 + x \). By Fundamental Theorem we have

   \[ \int_{0}^{\frac{1}{2}} (2x + 1) \, dx = F(x) \bigg|^{\frac{1}{2}}_{0} = (x^2 + x) \bigg|^{\frac{1}{2}}_{0} = \left[ \left( \frac{1}{2} \right)^2 + \left( \frac{1}{2} \right) \right] - \left[ 0^2 + 0 \right] \]
   \[ = \frac{1}{4} + \frac{1}{2} = \frac{3}{4}. \]