Math 2315 - Calculus II

Quiz #4 - 2010.02.17

Solutions

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1. Compute the following Integral:

$$\int \frac{3x-1}{x^2(1+x)}\,dx$$

This is a partial fractions problem. So we set

$$\frac{3x-1}{x^2(1+x)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{1+x}.$$

When $x = 0$, we get $-1 = B$, and when $x = -1$, we get $-4 = C$. We need to choose another value for x to find A. The simplest one is $x = 1$, but any x besides $x = 0$ and $x = -1$will work. When $x = 1$, we get $2 = 2A + 2B + C = 2A - 6$. Therefore $A = 4$. We now have

$$\int \frac{3x-1}{x^2(1+x)}\,dx = \int \frac{4}{x} + \frac{-1}{x^2} + \frac{-4}{1+x}\,dx.$$

The integral on the right hand side is quite simple to compute:

$$\int \frac{4}{x} + \frac{-1}{x^2} + \frac{-4}{1+x}\,dx = 4\ln(x) + \frac{1}{x} - 4\ln(1+x) + C.$$