Warm-Up Problems
January 29, 2003

1. Verify the following integrals (anti-derivatives) by differentiating. Notice the use of the chain rule in your derivatives.

   (a)

   $$\int 100(20x^4 - 1)(4x^5 - x)^{99}\, dx = (4x^5 - x)^{100} + C$$

   (b)

   $$\int -\cos(\cos x)\sin x\, dx = \sin(\cos x) + C$$

   (c)

   $$\int \frac{\cos t}{2\sqrt{\sin t + 1}}\, dt = \sqrt{\sin t + 1} + C$$

   (d)

   $$\int \frac{3w^2}{w^3 + 1}\, dw = \ln(w^3 + 1) + C$$

   (e)

   $$\int \frac{3}{x}\, dx = \ln(x^3) + C$$

   (f)

   $$\int \frac{2x}{\sqrt{1 - (x^2 + 1)^2}}\, dx = \sin^{-1}(x^2 + 1) + C$$

   (g)

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