Quiz 10 – MA 123F – Tuesday, Dec. 7, 2010

Name: Solutions

Show your work.

1. In each case (a)–(b), evaluate the integral.

(a) $\displaystyle\int_1^2 \left(6z^2 - \frac{1}{z^2}\right) dz = \frac{6z^3}{3} - \frac{-1}{z}\Big|_1^2 = 2z^3 + \frac{1}{z}\Big|_1^2 = \left(2\cdot 8 + \frac{1}{2}\right) - (2+1)$

$= 13 + \frac{1}{2} = \boxed{\frac{27}{2}}$

(b) $\displaystyle\int_1^{\pi/4} \left(\frac{1}{x} - \sec^2(x)\right) dx = \ln(x) - \tan(x)\Big|_1^{\pi/4} = \left(\ln(\pi/4) - \tan\left(\frac{\pi}{4}\right)\right) - \left(\ln(1) - \tan(1)\right)$

$= \ln\left(\frac{\pi}{4}\right) - 1 - (0 - \tan(1))$

$= \boxed{\ln\left(\frac{\pi}{4}\right) + \tan(1) - 1}$

2. In each case (a)–(b), give the most general antiderivative of the given function.

(a) $f(x) = \dfrac{3\sqrt{x} - x}{x^2} + e^x = 3x^{-3/2} - \frac{1}{x} + e^x$

so $F(x) = 3\cdot(-2)\,x^{-1/2} - \ln(x) + e^x + C$

$= \boxed{\frac{-6}{\sqrt{x}} - \ln(x) + e^x + C}$

(b) $g(t) = \dfrac{\sin(t)}{\cos^2(t)} = \dfrac{1}{\cos(t)}\,\dfrac{\sin(t)}{\cos(t)} = \sec(t)\tan(t)$

so $\boxed{F(t) = \sec(t) + C}$