Math 104-004 **Answers to Quiz # 10b** **30 Nov 07**

10 1. Evaluate the following:

(a) $\displaystyle\int_1^4 \left(x^3 + 5x + \frac{1}{x}\right)\,dx$,

(b) $\displaystyle\int_{-1}^0 y(2y^2-3)^5\,dy$.

Solution. For (a), we have

$$\begin{aligned}
\int_1^4 \left(x^3 + 5x + \frac{1}{x}\right)\,dx &= \frac{x^4}{4} + \frac{5x^2}{2} + \ln|x|\Big|_{x=1}^{x=4} \\
&= \left(\frac{4^4}{4} + \frac{5\cdot 4^2}{2} + \ln 4\right) - \left(\frac{1}{4} + \frac{5\cdot 1}{2} + \ln 1\right) \\
&= \frac{405}{4} + \ln 4
\end{aligned}$$

Note that (b) is Problem 21 from Section 7.4, a homework problem. We use the substituion $u = 2y^2 - 3$ so $du = 4y\,dy$ and hence $y\,dy = du/4$. If $x = -1$, $u = -1$ and if $x = 0$, $u = -3$. Thus,

$$\begin{aligned}
\int_{-1}^0 y(2y^2-3)^5\,dy &= \int_{-1}^{-3} \frac{u^5}{4}\,du \\
&= -\int_{-3}^{-1} \frac{u^5}{4}\,du \\
&= -\left(\frac{u^6}{24}\Big|_{u=-3}^{u=-1}\right) \\
&= -\left(\frac{1^6}{24} - \frac{3^6}{24}\right) \\
&= \frac{91}{3}
\end{aligned}$$