Calc 213, sections 301 & 302

Quizzes for week 4, spring 2008

Monday's Quiz

Integrate:

$$\int \frac{(s+1)^2}{s-1} ds$$

Solution
Solve by substitution. The troublesome part of the integral is the denominator.
(Why? Consider the following: $\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$ is always true, while $\frac{d}{e+f} = \frac{d}{e} + \frac{d}{f}$, is rarely true. So simplifying the denominator should make things easier.)

We make the substitution:

$$u = s - 1 \text{ and } s + 1 = u + 2$$
$$du = ds$$

The new form of the integral is easier to deal with:

$$\begin{aligned}
&= \int \frac{(u+2)^2}{u} du \\
&= \int \frac{u^2 + 4u + 4}{u} du \\
&= \int u + 4 + \frac{4}{u} du \\
&= \frac{u^2}{2} + 4u + 4\ln|u| + c \\
&= \frac{(s-1)^2}{2} + 4(s-1) + 4\ln|s-1| + c
\end{aligned}$$

Wednesday's Quiz

Integrate:

$$\int \frac{(s-2)^2}{s+1} ds$$

Solution
Similar to Monday's quiz, we solve by substitution.

$$u = s + 1 \text{ and } s - 2 = u - 3$$
$$du = ds$$

Now we make the switch to the u variables;

$$\begin{aligned}
&= \int \frac{(u-3)^2}{u} du \\
&= \int \frac{u^2 - 6u + 9}{u} du \\
&= \int u - 6 + \frac{9}{u} du \\
&= \frac{u^2}{2} - 6u + 9 \ln |u| + c \\
&= \frac{(s+1)^2}{2} - 6(s+1) + 9 \ln |s+1| + c
\end{aligned}$$