MATH 113 Solutions for Quiz 4
3 December 2003 Wednesday

Question-1: f is a function with f' continuous and with $f(1) = 1$, $f(2) = 3$, $f(4) = 6$, $f(14) = 17$. Evaluate $\int_1^2 (x^2 + 1)f'(x^3 + 3x)dx$.

Solution:

$$
\begin{aligned}
\int_1^2 (x^2 + 1)f'(x^3 + 3x)dx &= \frac{1}{3} \int_4^{14} f'(u)du \quad \text{where } u = x^3 + 3x \\
&= \frac{1}{3} f(u)\Big|_4^{14} \quad \text{Fundamental Theorem of Calculus} \\
&= \frac{11}{3}.
\end{aligned}
$$

Question-2: Evaluate $\int x \sin x \, dx$.

Solution:
Using integration by parts with $du = x$ and $dv = \sin x \, dx$ we get

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