Math 112
Quiz #4

Compute the following indefinite integrals. You must show all work to receive full credit.

1. $\int \frac{Ax}{B+Cx^2}\,dx.$

$$\int \frac{Ax}{B+Cx^2}dx = A\int \frac{x}{B+Cx^2}dx$$

Let $u = B+Cx^2$. Then,

$$du = 2Cx\,dx$$

$$\Rightarrow \int \frac{Ax}{B+Cx^2}dx = \frac{A}{2C}\int \frac{1}{u}du = \frac{A}{2C}\ln(|u|)+C = \frac{A}{2C}\ln(|B+Cx^2|)+D$$

2. $\int \frac{A}{B^2+x^2}\,dx.$

$$\int \frac{A}{B^2+x^2}dx = \frac{A}{B^2}\int \frac{1}{1+\left(\frac{x}{B}\right)^2}dx$$

Let $u = \frac{x}{B}$. Then,

$$du = \frac{1}{B}dx$$

$$\Rightarrow B\,du = dx$$

$$\Rightarrow \int \frac{A}{B^2+x^2}dx = \frac{A}{B}\int \frac{1}{1+u^2}du$$

$$= \frac{A}{B}\tan^{-1}\left(\frac{x}{B}\right)+C.$$