MATH 141 FALL 2008 MIDTERM 2 Question 3 Solution

$\int \frac{2}{x^2\sqrt{x^2+4}}dx$

$x = 2\tan u$ 5pts

$dx = 2\sec^2 u du$

$= \int \frac{4\sec^2 u}{4\tan^2 u\sqrt{4\tan^2 u+4}}du$

$= \int \frac{\sec^2 u}{\tan^2 u\sqrt{4\sec^2 u}}du$ 4pts

$= \int \frac{\sec u}{2\tan^2 u}du$

$= \int \frac{\cos u}{2\sin^2 u}du$ 3pts

$= \frac{1}{2}\frac{-1}{\sin u} + C$ 3pts

$= \frac{-1}{2}\frac{1}{\sin(\tan^{-1}\frac{x}{2})} + C$

$= -\frac{\sqrt{x^2+4}}{2x} + C$ 5pts