

HOMEWORK 4

IF $\sqrt{a^2 + x^2} \rightarrow$ SUBSTITUTE \tan

IF $\sqrt{a^2 - x^2} \rightarrow$ SUB \sin

IF $\sqrt{x^2 - a^2} \rightarrow$ SUB \sec

a) $\int \frac{dx}{\sqrt{9+x^2}}$

LET $x = 3 \tan \theta$
 $dx = 3 \sec^2 \theta d\theta$

$\int \frac{1}{\sqrt{9+9\tan^2\theta}} (3\sec^2\theta) d\theta \rightarrow \int \frac{1}{\sqrt{9\sec^2\theta}} (3\sec^2\theta) d\theta \rightarrow \int \frac{1}{\sec\theta} (3\sec^2\theta) d\theta \rightarrow \int 3\sec\theta d\theta$

b) $\frac{3}{\sqrt{1+9x^2}} dx$

$u = 3x$
 $du = 3dx \rightarrow dx = \frac{1}{3} du \rightarrow \int \frac{3}{\sqrt{1+u^2}} \frac{1}{3} du \rightarrow \int \frac{1}{\sqrt{1+u^2}} du$
 LET $u = \tan \theta$
 $du = \sec^2 \theta d\theta$

$\ln|\sqrt{9+x^2} + x|$

$\int \sec \theta d\theta = \ln|\tan \theta + \sec \theta|$

$\ln|\sec \theta + \tan \theta|$

$\ln|\sec(u) + \tan(u)|$

$\ln|\sec \theta + \tan \theta|$

$\int \frac{1}{\sqrt{1+u^2}} \sec^2 \theta d\theta \rightarrow \int \frac{1}{\sec \theta} \sec^2 \theta d\theta \rightarrow \int \sec \theta d\theta$