

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Show that $\int \frac{\sqrt{u^2 - a^2}}{u} du$ can be converted to $\int \tan^2 \theta d\theta$.

$$\text{Let } u = a \sec \theta$$

$$du = a \sec \theta \tan \theta \cdot d\theta$$

$$\int \frac{\sqrt{a^2 \sec^2 \theta - a^2}}{a \sec \theta} \cdot a \sec \theta \tan \theta \cdot d\theta$$

$$= \int \frac{a \sqrt{\sec^2 \theta - 1}}{a \sec \theta} \cdot a \sec \theta \tan \theta \cdot d\theta$$

$$= \int \tan^2 \theta d\theta$$

Excellent