

Evaluate:

1.  $\frac{d}{dw} \int_{w^3}^{\sin^2 w} \ln(t+1) dt$

2.  $\lim_{u \rightarrow 0} \left(1 + \frac{5}{7}u\right)^{\frac{8}{7}u}$

3. Use appropriate substitution and suitable formula from geometry to evaluate  $\int_{\pi/5}^{\pi/2} \sin u \sqrt{1 - 4 \cos^2 u} du$ .