

Math 114 Worksheet # 15: Trigonometric Integrals

1. Evaluate the following integrals.

(a) $\int \tan^2(x) dx$

(b) $\int \frac{\sin(\varphi)}{\cos^3(\varphi)} d\varphi$

(c) $\int \tan^5(x) \sec^3(x) dx$

(d) $\int \sin(8x) \cos(5x) dx$

(e) $\int \frac{1 - \tan^2(x)}{\sec^2(x)} dx$

(f) $\int x \sec^2(x^2) \tan^4(x^2) dx$

(g) $\int_{-\pi/4}^{\pi/4} \tan^3(x) dx$

(h) $\int_{\pi/4}^{\pi/2} \cot^3(x) dx$

2. Prove that for any two integers m and n

$$\frac{1}{\pi} \int_0^{2\pi} \cos(mx) \cos(nx) dx = \begin{cases} 0 & m \neq n \\ 1 & m = n \end{cases}.$$