

## 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  $n$

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