Calculus Quiz 14

1. (5 pts)

a. Evaluate the integral $\int \cos^{2n+1} x \sin^m x dx$ for $m, n \geq 0$.

b. A finite *Fourier series* is given by the sum $f(x) = \sum_{n=1}^{N} a_n \sin nx$. Show that the mth coefficient a_m is given by the formula

$$a_m = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \sin mx dx, \ m = 1, \cdots, N.$$

2. (5 pts) Evaluate the following integrals

a. $\int \sqrt{1+e^{2x}}dx.$

b. $\int \frac{x}{x^2+x+1}dx.$