1. (a) Suppose $f$ is continuous on the interval $[0, 1]$. Show

$$\int_0^\pi x f(\sin(x)) \, dx = \frac{\pi}{2} \int_0^\pi f(\sin(x)) \, dx.$$ 

(b) Let $n$ be a positive integer. Use the formula from (a) to compute the following integral:

$$\int_0^\pi \frac{x \sin^{2n}(x)}{\sin^{2n}(x) + \cos^{2n}(x)} \, dx.$$ 

2. Let $A = \int_0^\pi \cos(x) \frac{x}{(x+2)^2} \, dx$. Compute the integral

$$\int_0^{\pi/2} \sin(x) \cos(x) \frac{x}{x+1} \, dx$$

in terms of $A$. 