7. (*a*) Use the substitution $x = \sec\theta$ to show that

$$\int \sqrt{(x^2 - 1)}\ \mathrm{d}x$$

can be written as

$$\int \sec\theta \tan^2\theta\ \mathrm{d}\theta .$$

(3)

(*b*) Use integration by parts to show that

$$\int \sec\theta \tan^2\theta\ \mathrm{d}\theta = \frac{1}{2}\left[\sec\theta\tan\theta - \ln\left|\sec\theta + \tan\theta\right|\right] + \text{constant}.$$

(7)

(*c*) Evaluate $\int_0^{\frac{\pi}{4}} \sin x \sqrt{(\cos 2x)}\ \mathrm{d}x$.

(9)