

1. Evaluate each of the following antiderivatives. Are the answers correct? Explain. If Maple does not give you an answer, either rewrite the expression so that Maple can find the answer or find the answer on your own.

(a)  $\int \cos^2(x) \sin^3(x) dx$

(b)  $\int \frac{3x^2 - 4x + 1}{\sqrt{4x^3 - 8x^2 + 4x - 3}} dx$

(c)  $\int f(x) dx$  where  $f(x) = \frac{d}{dx} [4x\sqrt{\tan 3x}]$

(d)  $\int \sin \theta \sqrt[3]{\cos^2(\theta)} d\theta$

(e)  $\frac{d}{dt} [w(t)]$  where  $w(t) = \int \frac{t\sqrt{\sin t}}{\tan(3t+1)} dt$

2. Evaluate each definite integral. Give the exact answer if possible. If not, approximate to five places.

(a)  $\int_{-2}^3 \left| x^4 - x^3 - 22x^2 + 41x + 1 \right| dx$

(b)  $\int_{-\frac{\pi}{12}}^{\frac{\pi}{16}} \frac{\cos\left(4x + \frac{\pi}{2}\right)}{\sin^3\left(4x + \frac{\pi}{2}\right)} dx$

(c)  $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sec^2 x}{\sqrt[3]{\tan^4 x}} dx$

(d)  $\int_{-2}^1 f(x) dx$  where  $f(x) = \frac{d}{dx} \left[ \frac{3x^3 + 4x - 1}{4x^4 + 3x^2 + 2} \right]$

3. Given that the acceleration of a certain particle in a linear tube is given by  $a(t) = 4t \cos(3t)$  and the initial velocity is 4 meters per second, find the velocity of the particle at 5 seconds.