

Homework #1

Please print your name:

Problem 1. (5.4.23) Evaluate the following integral.

$$\int_1^{\sqrt{2}} \frac{s^2 + \sqrt{s}}{s^2} ds$$

Solution.

$$\int_1^{\sqrt{2}} \frac{s^2 + \sqrt{s}}{s^2} ds = \int_1^{\sqrt{2}} (1 + s^{-3/2}) ds = \left[s + \frac{1}{-1/2} s^{-1/2} \right]_1^{\sqrt{2}} = \left[s - \frac{2}{\sqrt{s}} \right]_1^{\sqrt{2}} = \left(\sqrt{2} - \frac{2}{\sqrt{\sqrt{2}}} \right) - (1 - 2) = \sqrt{2} - 2^{3/4} + 1$$

□

Problem 2. (5.5.29) Evaluate the following indefinite integral:

$$\int x^{1/2} \sin(x^{3/2} + 1) dx$$

Solution. We substitute $u = x^{3/2} + 1$. Since

$$\frac{du}{dx} = \frac{3}{2} x^{1/2} \quad \rightsquigarrow \quad \frac{2}{3} du = x^{1/2} dx,$$

we find

$$\int x^{1/2} \sin(x^{3/2} + 1) dx = \frac{2}{3} \int \sin(u) du = -\frac{2}{3} \cos(u) + C = -\frac{2}{3} \cos(x^{3/2} + 1) + C.$$

□