

## Integration by Substitution

**37.** Compute the following integral:

$$\int \frac{\sin x \, dx}{\sqrt{1 + 2 \cos x}}.$$

**38.** Compute:

$$\int \tan \varphi \, d\varphi.$$

**39.** Compute:

$$\int \sin x \cos^3 x \, dx,$$

and verify the result by differentiation.

## Integration by Parts

**40.** Compute the following integral:

$$\int x (\ln x)^2 \, dx.$$

**41.** Compute the following integral:

$$\int (3x + 4) \sin(2x) \, dx.$$

## Integration of Rational Functions

**42.** Determine:

$$\int \frac{dx}{x^3 + x}.$$

**43.** Compute:

$$\int_0^1 \frac{x^4}{x^2 + 1} \, dx.$$

**44.** Determine:

$$\int \frac{x^2 - x + 1}{x^3 + x} \, dx.$$

All above math problems are taken from the following website:

<https://osebje.famnit.upr.si/~penjic/teaching.html>.

THE READER CAN FIND ALL SOLUTIONS TO THE GIVEN PROBLEMS ON THE SAME PAGE.