

Mathematics II

First Practice

1. Solve each of the following indefinite integrals (i.e. find all the antiderivatives of each given function):

$$a) \quad \int x^3 \cos x^4 dx$$

$$b) \quad \int \cos x \cdot e^{\sin x} dx$$

$$c) \quad \int e^x \tan(e^x) dx$$

$$d) \quad \int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$$

$$e) \quad \int x \arctan x dx$$

$$f) \quad \int x \sin x dx$$

$$g) \quad \int (3 + x^5) \log x dx$$

$$h) \quad \int \frac{1}{x (\log x + \log^2 x)} dx$$

$$i) \quad \int \frac{x - 3}{(x - 1)(x - 2)} dx$$

2. Evaluate the following definite integrals:

$$a) \quad \int_3^4 x \sqrt{x - 3} dx$$

$$b) \quad \int_2^3 \frac{x + 1}{\sqrt{x^2 + 2x + 3}} dx$$

$$c) \quad \int_0^1 \sqrt{1 + \sqrt{x}} dx$$

$$d) \quad \int_0^1 \arctan x dx$$

$$e) \quad \int_1^2 x^3 e^{x^2} dx$$

$$f) \quad \int_0^1 \frac{\ln(x+1)}{\sqrt{x+1}} dx$$

$$g) \quad \int_0^{\pi/2} \sin^2 x dx$$

$$h) \quad \int_0^1 \frac{1}{e^x + 1} dx$$

$$i) \quad \int_1^2 \frac{1}{(1+x)(2+x)} dx$$