Problem 1. [4 points] Calculate the following primitives:

a) **[2 points]**

$$\int \frac{4x^4 - x^3 - 46x^2 - 20x + 153}{(x-2)(x-3)(x+3)}\, dx$$

b) **[2 points]**

$$\int x \tan^2(2x)\, dx$$

Problem 2. [2 points] Given the function

$$f(x) = \begin{cases} \dfrac{e^x - 1 - x}{x^2}, & x < 0 \\[2mm] a + b \displaystyle\int_0^x e^{-t^4}\, dt, & x \ge 0. \end{cases}$$

calculate a and b so that it is continuous and differentiable.

Problem 3. [4 points] a) **[2 points]** Calculate the area delimited by the curves $x^2 + y^2 = 1$ and $x^2 + y^2 = 2x$.

b) **[2 points]** Calculate the volume of the solid generated when the region betweent the curves $y = x$ and $y = \sin x$ revolves around the x axis, with $0 \le x \le \pi$.

Problem 1. [4 points] Calculate the following primitives:

a) **[2 points]**

$$\int \frac{4x^4 - x^3 - 46x^2 - 20x + 153}{(x-2)(x-3)(x+3)}\,dx$$

b) **[2 points]**

$$\int x \tan^2(2x)\,dx$$

Solution. a) Problem 9.2.v

   b) Problem 9.5.i   ■

Problem 2. [2 points] Given the function

$$f(x) = \begin{cases} \frac{e^x - 1 - x}{x^2}, & x < 0 \\ a + b \int_0^x e^{-t^4}\,dt, & x \geq 0. \end{cases}$$

calculate a and b so that it is continuous and differentiable.

Solution. Problem 10.12   ■

Problem 3. [4 points] a) **[2 points]** Calculate the area delimited by the curves $x^2 + y^2 = 1$ and $x^2 + y^2 = 2x$.

b) **[2 points]** Calculate the length of the curve $x^{2/3} + y^{2/3} = 4$. with $0 \leq x \leq 8$.

Solution. a) Problem 11.1.ii

   b) Problem 11.8.iii.   ■