Differential and Integral Calculus 1
MS-A0111
Hakula
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Problem Sheet for Week 40 (B), 2021

A!   **P**

Note[1]

The due date is published on the course pages. Homework can be submitted only digitally. Instructions on labelling the "papers" can be found on the course pages.

1 Introductory Problems

Intro 13   Evaluate the integrals using the method of substitution

$$\text{a)} \int \frac{x\,dx}{(x^2+1)^3}, \qquad \text{b)} \int \frac{x^2\,dx}{(ax^3+b)\sqrt{ax^3+b}},$$

$$\text{c)} \int \frac{\cos x}{\sqrt[3]{\sin^2 x}}\,dx, \qquad \text{d)} \int (1+\tan^2 x)\sqrt{\tan x}\,dx,$$

Intro 14

$$\text{e)} \int \frac{dx}{(\arcsin x)\sqrt{1-x^2}}, \qquad \text{f)} \int \frac{dx}{(\arctan x)(1+x^2)},$$

$$\text{g)} \int \frac{dx}{\sqrt{6-x^2}}, \qquad \text{h)} \int \frac{dx}{1+\sqrt{x+1}}.$$

2 Homework Problems

Exercise 13   Evaluate the integral

$$\int \frac{dx}{x^2\sqrt{x^2+a^2}}$$

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using three different substitutions a) $x = 1/t$, b) $x = a\tan t$, c) $x = a\sinh t$.

EXERCISE 14 Evaluate the integral

$$\int_0^{3\pi} \frac{\cos x \, dx}{2 + \sin x}$$

using a suitable trigonometric substitution. Comment on the change of metric, that is, on how the interval changes.
(Are you comfortable with this result?)