

Module 1 Exam A

Instructor: Alexander Paulin

Student Name and ID : _____

1. (30 points) Compute the following integrals

(a)

$$\int \arcsin(x) dx$$

Solution:

(b)

$$\int \frac{1}{x^2 \sqrt{1+4x^2}} dx$$

Solution:

2. (30 points) (a) Express the following rational function

$$\frac{\frac{x^3}{2} + 2x^2 + 2x + 4}{x^4 + 4x^2}$$

as a sum of partial fractions.

Solution:

- (b) Hence evaluate the integral

$$\int \frac{\frac{x^3}{2} + 2x^2 + 2x + 4}{x^4 + 4x^2} dx$$

Solution:

3. (30 points) Determine if the following improper integrals are convergent or divergent. Justify your answers.

(a)

$$\int_0^{\infty} \frac{\sin(\sqrt{x}) + 4}{x^2} dx$$

Solution:

(b)

$$\int_{-1}^1 \frac{\cos(1/x^2)}{x^3} dx$$

4. For n a positive integer, let M_n be the n^{th} midpoint approximation of the definite integral

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

Is it possible that $M_{1000} = 1$? Carefully justify your answer.

Solution:

