Assignment

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Q.1

Review of integration Concept

Ans It Contain Some major Concept integration including

1) Substitution method
2) Integration by parts
3) Integration Rational function

Substitution method:

→ $\int f(g(x))\, g'(x)\, dx = \int f(u)\, du$

If the function $f(u)$ has an easily ~~indentif~~ indentification

anti derivatives then all is well-
If not another Substitution method
may be needed

Integration by Parts:-

$$\rightarrow [u(x)v(x)]' = u'(x)v(x) + u(x)v'(x)$$

$$= u(x)v'(x) = [u(x)v(x)]' - u'(x)v(x)$$

$$= \int u(x)'v'(x)dx = u(x)v(x) - \int v'(x)u(x)dx$$

$$= \int u\,dv = uv - \int v\,dv$$

In case of definate integral we have

$$\int_a^b u(x)v'(x)dx = [u(x)v(x)]_{x=a}^{x=b} - \int_a^b u'(x)v(x)dx$$

(4)

Integrating Rational function

$$\Rightarrow \frac{3x+2}{2x^2+x-3} = \frac{3x+2}{(2x+3)(x-1)}$$

To integrate such a function, we use the method of partial fraction to split the function into easily integrable pieces.

$$\frac{3x+2}{(2x+3)(x-3)} = \frac{1}{2x+3} + \frac{1}{x-1}$$

Now

$$\int \frac{3x+2}{2x^2+x-3}\,dx = \frac{1}{2}\log(2x+3) + \log(x-1) + C$$

(5)

Q.2) Application of Trapezoidal Rule and Simpson' Rule in engineering

Ans" Application of Trapezoidal Rule"

- The trapezoidal rule is one of the family member of numerical integration formula
- The trapezoidal rule has faster convergence
- Moreover the trapezoidal rule tends to become extremely accurate then periodic functions

Application of Simpson's Rule

- Simpson's Rule is a numerical method for approximating the integral of a function between two limits a & b. Its based on knowing the area under a parabola, or a plane curve-

- It include the calculation of a vessels displacement, total wetted surface area, and the calculation of the longitudinal center of buoyancy of the hull.

- It is a (7) Weighted average that results in an even more accurate approximation.