Trapezium Rule Homework

Literacy

Trapezium rule, Estimate, iterations, approximate

Research

Are there any more numerical methods of integration?

Memory

$$h = \frac{b-a}{n}$$

$$\int_a^b y\,dx \approx \frac{h}{2}(y_0 + 2(y_1 + y_2 + \cdots + y_{n-1}) + y_n)$$

Skills

1. **Use the trapezium rule with 5 ordinates to find an approximation for $\int_0^2 \frac{2}{1+x}\,dx$**

2. **Use the trapezium rule with 5 strips to find an approximation for $\int_1^2 \frac{1}{x^2+4}\,dx$**

3. **Use the trapezium rule with 6 strips to find an approximation for $\int_0^1 \frac{4}{(1+x^2)}\,dx$**

Plot the above curves using graph plotting software. Does the trapezium rule give an overestimate or an underestimate?

Stretch

a. Find $\int 4x^3 + 2x^{\frac{1}{2}} + 7 + x^{-2}\,dx$

b. A car starts from rest and its speed is measured by an electronic device, every 2 seconds during the first 10 seconds of its motion. Use the trapezium rule with 6 ordinates to estimate the distance travelled by the car.

Time(s)	0	2	4	6	8	10
Speed (ms^{-1})	0	4.91	10.8	15.4	17.0	17.9