**Chapter 3**

**Techniques of Integration**

**3.6 Numerical Integration**

**Section Exercises**

**Approximate the following integrals using either the midpoint rule, trapezoidal rule, or Simpson’s rule as indicated. (Round answers to three decimal places.)**

299.  trapezoidal rule; 

Answer: 0.696

301.  Simpson's rule; 

Answer: 9.279

303.  midpoint rule; 

Answer: 0.5000

305. Use the trapezoidal rule with four subdivisions to estimate 

Answer: 

**Approximate the integral to three decimal places using the indicated rule.**

307.  trapezoidal rule; 

Answer: 0.500

309.  Simpson’s rule; 

Answer: 1.1614

311.  Simpson’s rule; 

Answer: 0.6577

313.  Simpson’s rule; 

Answer: 0.0213

315.  Simpson’s rule; 

Answer: 1.5629

317. Approximate  using the midpoint rule with four subdivisions to four decimal places.

Answer: 1.9133

319. Use the trapezoidal rule with four subdivisions to estimate  to four decimal places.

Answer: 

321. Using Simpson’s rule with four subdivisions, find 

Answer: 1.0

323. Given  use the trapezoidal rule with 16 subdivisions to approximate the integral and find the absolute error.

Answer: Approximate error is 0.000325.

325. Find an upper bound for the error in estimating  using the trapezoidal rule with seven subdivisions.

Answer: 

327. Find an upper bound for the error in estimating  using Simpson’s rule with  steps.

Answer: 

329. Estimate the minimum number of subintervals needed to approximate the integral  with an error magnitude of less than 0.0001 using the trapezoidal rule.

Answer: 475

331. Estimate the minimum number of subintervals needed to approximate the integral  with an error of magnitude less than 0.0001 using the trapezoidal rule.

Answer: 174

333. Use Simpson’s rule with four subdivisions to approximate the area under the probability density function  from  to 

Answer: 0.1544

335. The length of one arch of the curve  is given by  Estimate *L* using the trapezoidal rule with 

Answer: 6.2807

337. Estimate the area of the surface generated by revolving the curve  about the *x*-axis. Use the trapezoidal rule with six subdivisions.

Answer: 4.606

339. The growth rate of a certain tree (in feet) is given by  where *t* is time in years. Estimate the growth of the tree through the end of the second year by using Simpson’s rule, using two subintervals. (Round the answer to the nearest hundredth.)

Answer: 3.41 ft

341. **[T]** Given  approximate the value of this integral using the midpoint rule with 16 subdivisions and determine the absolute error.

Answer:  absolute error = 0.125

343. The table represents the coordinates  that give the boundary of a lot. The units of measurement are meters. Use the trapezoidal rule to estimate the number of square meters of land that is in this lot.

|  |  |  |  |
| --- | --- | --- | --- |
| ***X*** | ***y*** | ***x*** | ***y*** |
| 0 | 125 | 600 | 95 |
| 100 | 125 | 700 | 88 |
| 200 | 120 | 800 | 75 |
| 300 | 112 | 900 | 35 |
| 400 | 90 | 1000 | 0 |
| 500 | 90 |  |  |

Answer: about 89,250 m2

345. The “Simpson” sum is based on the area under a \_\_\_\_.

Answer: parabola

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