

Abraham Cepeda

Problem 2. Write down indefinite integral

1. $\int f(x) = 1 \rightarrow 1 \cdot x \rightarrow x + C$

2. $\int f(x) dx = x \rightarrow \frac{x^{1+1}}{1+1} \rightarrow \frac{x^2}{2} + C$

3. $\int f(x) dx = x^2 \rightarrow \frac{x^{2+1}}{2+1} \rightarrow \frac{x^3}{3} + C$

4. $\int f(x) dx = x^3 \rightarrow \frac{x^{3+1}}{3+1} \rightarrow \frac{x^4}{4} + C$

5. $\int f(x) dx = \sqrt{x} \rightarrow \frac{x^{\frac{1}{2}+1}}{\frac{1}{2}+1} \rightarrow \frac{2}{3} x^{\frac{3}{2}} + C$

6. $\int f(x) dx = e^x \rightarrow e^x + C$

7. $\int f(x) dx$

7. $\int f(x) dx = 2^x \rightarrow \frac{2^x}{\log(2)} + C$

8. $\int f(x) dx = \log(x) \rightarrow x \cdot \log(x) - x + C$

9. $\int f(x) dx = \sin(x) \rightarrow -\cos(x) + C$

10. $\int f(x) dx = \cos(x) \rightarrow \sin(x) + C$

Problem 5. Abraham Cepeda

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$$1. f(x) = 1 \quad \int f(x) dx = 1 \rightarrow x$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	1	1	1	1	N/A
(trapezoid)	1	1	1	1	4
(quadrature)	1	1	1	1	4
(Simpson)	1	1	1	1	4

$$2. f(x) = x \quad \int f(x) dx = x^2/2$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	1	2	3	4	N/A
trapezoid	1.5	2.5	3.5	4.5	12
quadrature	1.5	2.5	3.5	4.5	12
Simpson	1.5	2.5	3.5	4.5	12

$$3. f(x) = x^2 \quad \int f(x) dx = x^3/3$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	1	4	9	16	N/A
trapezoid	2.25	6.25	12.25	20.25	41
quadrature	2.5	6.5	12.5	20.5	42
Simpson	2.33	6.3	12.33	20.33	41.33

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$$4. f(x) = x^3 \quad \int f(x) dx = x^3 \rightarrow x^4/4$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	1	8	27	64	N/A
trapezoid	3.38	15.62	42.80	91.12	153
quadrature	4.5	17.5	45.5	94.5	162
Simpson	3.75	16.25	43.75	92.25	156

$$5. f(x) = \sqrt{x} \quad \int f(x) dx = \frac{2}{3} x^{3/2}$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	1	1.41	1.73	2	N/A
trapezoid	1.22	1.58	1.87	2.12	6.8
quadrature	1.21	1.57	1.87	2.12	6.76
Simpson	1.22	1.58	1.87	2.12	6.79

$$6. f(x) = e^x \quad \int f(x) dx = e^x \rightarrow e^x$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	2.72	7.39	20.09	54.6	N/A
trapezoid	4.48	12.18	33.12	90.02	139.8
quadrature	5.05	13.74	37.34	101.51	157.64
Simpson	4.67	12.7	34.52	93.85	145.74

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$$7. f(x) = 2^x \quad \int f(x) dx = 2^x \rightarrow 2^x / \log(2)$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	2	4	8	16	N/A
trapezoid	2.83	5.66	11.31	22.63	42.43
quadrature	3	6	12	24	45
simpson	2.89	5.77	11.54	23.08	43.28

$$8. f(x) = \log(x) \quad \int f(x) dx = \log x \rightarrow x \log(x) - x$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	0	0.69	1.01	1.39	N/A
trapezoid	0.4	0.92	1.25	1.5	4.08
quadrature	0.35	0.9	1.24	1.5	3.98
simpson	0.39	0.9	1.25	1.5	4.05

$$9. f(x) = \sin(x) \quad \int f(x) dx = -\cos(x) \rightarrow -\cos(x)$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	0.84	0.9	0.14	-0.76	N/A
trapezoid	1	0.6	-0.35	-0.98	0.27
quadrature	0.88	0.53	-0.31	-0.86	0.23
simpson	0.96	0.57	-0.34	-0.94	0.26

$$10. f(x) = \cos(x) \quad \int f(x) dx = \cos(x) \rightarrow \sin(x)$$

Interval	1	2	3	4	Total area
x	1	2	3	4	N/A
f(x)	0.54	-0.42	-0.99	-0.65	N/A
trapezoid	0.07	-0.8	-0.94	-0.21	-1.88
quadrature	0.06	-0.7	-0.82	-0.19	-1.65
simpson	0.07	-0.77	-0.9	-0.2	-1.8