

25.5

(3) a) Trapezoidal Rule

$$\Delta x = \frac{b-a}{n} = \frac{2-0}{4} = 0.5$$

$x$	$y = 2x^2$
0	0
0.5	0.5
1	2
1.5	4.5
2	8

$$\int_0^2 2x^2 dx \approx \frac{0.5}{2} [0 + 2(0.5) + 2(2) + 2(4.5) + 8]$$

$$\approx 5.5$$

$$\begin{aligned} \text{b) } \int_0^2 2x^2 dx &= \left. \frac{2x^3}{3} \right|_0^2 \\ &= \frac{16}{3} \\ &\approx 5.33 \end{aligned}$$

The approximation is decent.

⑤ a) Trapezoidal Rule

$$\Delta x = \frac{b-a}{n} = \frac{4-1}{6} = 0.5$$

$x$	$y = 1 + \sqrt{x}$
1	2
1.5	2.2247
2	2.4142
2.5	2.5811
3	2.7321
3.5	2.8708
4	3

$$\int_1^4 (1 + \sqrt{x}) dx \approx \frac{0.5}{2} [2 + 2(2.2247 + 2.4142 + 2.5811 + 2.7321 + 2.8708) + 3]$$

$$\approx 7.66$$

$$\begin{aligned} \text{b) } \int_1^4 (1 + \sqrt{x}) dx &= \left[ x + \frac{2}{3} x^{3/2} \right]_1^4 \\ &= \left( 4 + \frac{16}{3} \right) - \left( 1 + \frac{2}{3} \right) \\ &= 3 + \frac{14}{3} \\ &= \frac{23}{3} \\ &\approx 7.67 \end{aligned}$$

The approximation is good.

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$$\Delta x = \frac{b-a}{n} = \frac{5-0}{5} = 1$$

$x$	$y = \sqrt{25-x^2}$
0	$\sqrt{25} = 5$
1	$\sqrt{24}$
2	$\sqrt{21}$
3	$\sqrt{16} = 4$
4	$\sqrt{9} = 3$
5	$\sqrt{0} = 0$

$$\int_0^5 \sqrt{25-x^2} dx \approx \frac{1}{2} [5 + 2(\sqrt{24} + \sqrt{21} + 4 + 3) + 0]$$
$$\approx 19.0$$

(11)

$$\Delta x = \frac{5-1}{10} = 0.4$$

$x$	$y = \frac{1}{x^2+x}$
1	$\frac{1}{2}$
1.4	$\frac{1}{3.36}$
1.8	$\frac{1}{5.04}$
2.2	$\frac{1}{7.04}$
2.6	$\frac{1}{9.36}$
3	$\frac{1}{12}$
3.4	$\frac{1}{14.96}$
3.8	$\frac{1}{18.24}$
4.2	$\frac{1}{21.84}$
4.6	$\frac{1}{25.76}$
5	$\frac{1}{30}$

$$\int_1^5 \frac{1}{x+x^2} dx \approx \frac{0.4}{2} \left[ \frac{1}{2} + 2 \left( \frac{1}{3.36} + \frac{1}{5.04} + \frac{1}{7.04} + \frac{1}{9.36} + \frac{1}{12} + \frac{1}{14.96} + \frac{1}{18.24} + \frac{1}{21.84} + \frac{1}{25.76} \right) + \frac{1}{30} \right]$$

$$\approx 0.520$$

(15)

	$x$	$y$
interval #1	2	0.670
interval #2	4	2.34
	6	4.56
	8	3.67
	10	3.56
interval #6	12	4.78
	14	6.87

$$n=6$$
$$a=2 \quad b=14$$

$$\Delta x = \frac{b-a}{n} = \frac{14-2}{6} = 2$$

$$\int_2^{14} y dx \approx \frac{2}{2} [0.670 + 2(2.34 + 4.56 + 3.67 + 3.56 + 4.78) + 6.87]$$

$$\approx 45.4$$