25.6

(3) a) Simpson's Rule

$$\Delta x = \frac{2-0}{2} = 1$$

x	$y = 1 + x^3$
0	1
1	2
2	9

$$\int_0^2 (1+x^3)\,dx \approx \frac{1}{3}\left[1 + 4(2) + 9\right]$$
$$\approx 6$$

b) $$\int_0^2 (1+x^3)\,dx = \left[x + \frac{x^4}{4}\right]_0^2$$
$$= (2 + 4) - 0$$
$$= 6$$

Simpson's Rule perfectly approximates the integral.

(7) $\Delta x = \frac{b-a}{n} = \frac{5-0}{4} = 1.25$

x	$y = \sqrt{25-x^2}$
0	5
1.25	$\sqrt{23.4375}$
2.5	$\sqrt{18.75}$
3.75	$\sqrt{10.9375}$
5	0

$$\int_0^5 \sqrt{25-x^2}\,dx \approx \frac{1.25}{3}\left[5 + 4\sqrt{23.4375} + 2\sqrt{18.75} + 4\sqrt{10.9375} + 0\right]$$

$$\approx 19.3$$

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

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	$\frac{1}{30}$

$$\int_1^5 \frac{1}{x^2+x}\,dx \approx \frac{0.4}{3}\left[\frac{1}{2} + \frac{4}{3.36} + \frac{2}{5.04} + \frac{4}{7.04} + \frac{2}{9.36} + \frac{4}{12} + \frac{2}{14.96} + \frac{4}{18.24} + \frac{2}{21.84} + \frac{4}{25.76} + \frac{1}{30}\right]$$

$$\approx 0.511$$

(13)

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

$n = 6$

$a = 2 \quad b = 14$

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

$$\int_2^{14} y\,dx \approx \frac{2}{3}\left[0.670 + 4(2.34) + 2(4.56) + 4(3.67) + 2(3.56) + 4(4.78) + 6.87\right]$$

$$\approx 44.6$$