AP Calculus AB

Approx Area Using Riemann Sums - Table

1)

a) $T_4 = \frac{1}{2}\left[f(0) + f(0.25)\right]\cdot(0.25) + \frac{1}{2}\left[f(0.25) + f(0.5)\right](0.25) + \frac{1}{2}\left[f(0.5) + f(0.75)\right]\cdot(0.25)$
$+ \frac{1}{2}\left[f(0.75) + f(1.0)\right]\cdot(0.25)$

$= \frac{1}{2}\left(\frac{1}{4}\right)\left[1.0 + 2(0.8) + 2(1.3) + 2(1.1) + 1.6\right]$

b) $R_4 = \frac{1}{4}\left[f(1.0) + f(0.75) + f(0.5) + f(0.25)\right]$

$= \frac{1}{4}\left[1.6 + 1.1 + 1.3 + 0.8\right]$

c) $M_2 = f(0.25)\cdot(0.5) + f(0.75)\cdot(0.5)$

$= 0.5\left[0.8 + 1.1\right]$

2) a) $T_4 = \frac{1}{2}\left[f(0) + f(4)\right]\cdot 4 + \frac{1}{2}\left[f(4) + f(16)\right]\cdot 12 + \frac{1}{2}\left[f(16) + f(17)\right]\cdot 1 + \frac{1}{2}\left[f(17) + f(20)\right]\cdot 3$

$= 2\left[8 + 4\right] + 6\left[4 + 6\right] + \frac{1}{2}\left[6 + 3\right] + \frac{3}{2}\left[3 + 6\right]$

b) $R_4 = f(20)\cdot 3 + f(17)\cdot 1 + f(16)\cdot 12 + f(4)\cdot 4$

$(6)(3) + (3) + (6)(12) + (4)(4)$

3)

a) $L_5 = f(0)\cdot 2 + f(2)\cdot 2 + f(4)\cdot 2 + f(6)\cdot 2 + f(8)\cdot 10$

$= 2\left[12.5 + 13.4 + 13.9 + 14.3 + 14.6\right]$

b) $f'(5) \approx \frac{f(6) - f(4)}{6 - 4} = \frac{14.3 - 13.9}{2}$

c) $ROC = \frac{f(10) - f(0)}{10 - 0} = \frac{14.8 - 12.5}{10}$

d) $\int_0^{10} f'(x)\,dx = \left[f(x) + C\right]\Big|_0^{10}$

$= f(10) - f(0)$

$= 14.8 - 12.5$

4)

a) $T_4 = \frac{1}{2}[R(0)+R(3)]\cdot 3 + \frac{1}{2}[R(3)+R(5)]\cdot 2 + \frac{1}{2}[R(5)+R(9)]\cdot 4 + \frac{1}{2}[R(9)+R(11)]\cdot 2$

$= \frac{3}{2}[20+18] + [18+12] + 2[12+15] + [15+19]$

b) $R'(4) \approx \frac{R(5)-R(3)}{5-3} = \frac{12-18}{2}$

c) $ROC = \frac{R(11)-R(0)}{11-0}$

$= \frac{19-20}{11}$

d) $\int_0^{11}(3+R'(t))\,dt$

$[3t + R(t) + C]\Big|_0^{11}$

$[33 + R(11)] - [0 + R(0)]$

$[33 + 19] - [20]$