2) $V_0 = 200L$

$T_E = 4L/min$

$T_S = 2L/min$

$C_1 = 1g/L$

$$\frac{\partial A}{\partial t} = (1)(4) - 2\left(\frac{A}{200+(4-2)t}\right)$$

$$\frac{\partial A}{\partial t} + \underbrace{\frac{A}{100+t}}_{P(t)} = 4$$

$$F.I = e^{\int \frac{1}{100+t} dt}$$

$$= \cancel{e}^{\cancel{\ln}(100+t)}$$

$$= (100+t)$$

$$\underbrace{(100+t)\frac{\partial A}{\partial t} + A} = 4(100+t)$$

$$\int \frac{\partial}{\partial t}(100+t)A = \int 400 + 4t \, dt$$

$$(100+t)A = 400t + 2t^2 + C$$

$$A = \frac{400t + 2t^2 + C}{(100+t)}$$

$$A(t) = \frac{400t + 2t^2 + 3000}{(100+t)} \to a$$

$$A(t) = \frac{400t + 2t^2 + 416}{(100+t)} \to b$$

$$A(5) = \frac{400(5) + 2(5)^2 + 416}{100+(5)} = 23{,}4857 \to b$$

a $A(0) = 30g$

$$A(2) = \frac{400(0) + 2(0)^2 + C}{100+(0)} = 30g$$

$$\boxed{C = 3000}$$

b $A(2) = 12g$

$$A(2) = \frac{400(2) + 2(2)^2 + C}{100+(2)} = 12g$$

$$\boxed{C = 416}$$

5.0

c. $h = \frac{X_f - X_o}{n}$

$X_o = 2$

$X_f = 5$

$n = 500$

$h = 0{,}006$

Taller de Metodos

7.

$$\frac{dA}{dt} = R_i - R_f = C_i T_i - C_f T_f$$

$$\frac{dA}{dt} = \left(\frac{0.06}{100}\right)(2000) - 2000\left[\frac{A}{8000 + (2000-2000)t}\right]$$

$$\frac{dA}{dt} = 1{,}2 - \frac{A}{4} \rightarrow \frac{dA}{dt} + \frac{A}{4} = 1{,}2$$

$$p(t) = \frac{1}{4} \rightarrow \mu(t) = e^{\int \frac{1}{4} dt} = e^{t/4}$$

$$e^{t/4}\frac{dA}{dt} + \frac{e^{t/4}}{4}A = 1{,}2\, e^{t/4}$$

$$\frac{d}{dt}\left[e^{t/4} A\right] = 1{,}2\, e^{t/4}$$

$$\int d\left[e^{t/4} A\right] = \int 1{,}2\, e^{t/4}\, dt$$

$$A(t) = \frac{24}{5} + (11{,}2)\, e^{-t/4} \qquad A(0) = \left(\frac{0.2}{100}\right)(8000)$$

$$= 16$$

$$16 - 4.8 = C$$

$$C = 11.2$$

$$A(t) = 4{,}8 + (11{,}2)\, e^{-t/4}$$

$$A(2) = 11{,}5931$$

4 $x_1' = -0{,}1 x_1 x_2$ $\qquad x_1(0) = 10$

$x_2 = -x_1$ $\qquad x_2(0) = 15$

$(x_1)_{n+1} = (x_1)_n + \frac{1}{6}(k_1 + 2k_2)$

$(x_2)_{n+1} = (x_2)_n + \frac{1}{6}(C_1 + 2C_2)$

$k_1 = hf(t_n, (x_1)_n, (x_2)_n)$

$C_1 = hg(t_n, (x_1)_n, (x_2)_n$

$k_2 = hf(t_n + \frac{h}{2}, (x_1)_n + \frac{k_1}{2}, (x_2)_n + \frac{C_1}{2});$

$C_2 = hg(t_n + \frac{h}{2}, (x_1)_n + \frac{k_1}{2}, (x_1) + \frac{C_2}{2});$

$k_3 = hf(t_n + \frac{h}{2}, (x_1)_n + \frac{k_2}{2}, (x_2)_n + \frac{C_2}{2});$

$C_3 = hg(t_n + \frac{h}{2}, (x_1)_n + \frac{k_2}{2}, (x_2)_n + \frac{C_3}{2});$

$f(t_n, (x_1)_n, (x_2)_n = x_1' = -0{,}1 x_1 x_2$

$g(t_n, (x_1)_n, (x_2)_n = x_2' = -x_1$

$k_1 = 0{,}1(-0{,}1)(10(15)) = -15$

$C_1 = -0{,}1(10) = -1$

$k_2 = 0{,}1(-0{,}1(10 + 1/2(-1{,}5))(15 + 1/2(-1)) = -1341$

$C_2 = -0{,}1(10 + 1/2(-1{,}5)) = -0{,}925$

$x_1(0{,}1) = 10 + \frac{1}{6}(k_1 + 2k_2)$

$= 10 + 1/6(-1{,}5 + 2(-1{,}3412x5) = \boxed{6{,}26}$

$x_2(0{,}1) = 15 + 1/6(C_1 + 2C_2)$

$= 15 + 1/6(-1 + 2(-0{,}925)) = \boxed{12{,}0699}$

Rta// Las tropas convencionales ganarán el conflicto

Escaneado con CamScanner

5.

$$20\frac{d^2q}{dt^2} + 2\frac{dq}{dt} = 120$$

$$I = \frac{dq}{dt} \qquad I' = \frac{d^2q}{dt^2}$$

$$\frac{dI}{dt} + \frac{1}{10}I = 6V$$

$$p(t) = \frac{1}{10} \qquad \mu(t) = e^{\int \frac{1}{10}dt} = e^{t/10}$$

$$e^{t/10}\frac{dI}{dt} + \frac{1}{10}e^{t/10}I = 6e^{t/10}$$

$$\int d(e^{t/10} I) = \int 6e^{t/10}dt$$

$$I(t) = 60 + C_1 e^{(-1/10)t}$$

$$0 = 60 + C_1 \quad \to \quad C_1 = -60$$

$$q(t) = 60t + (-60)(-10)e^{(-1/10)t} + C_2$$

$$1 = 600 + C_2 \quad \to \quad C_2 = -599$$

$$I(2) = 10{,}87\,A$$

$$q(2) = 12{,}23$$

6 $f'(x) = -5/4 \ln(2x^2+1)$

$$f''(x) = \frac{-30x^2-5}{(2x^2+1)^2}$$

$$f'''(x) = \frac{(-60x)(2x^2+1)^{\cancel{2}} - (-30x^2-5)(2\cancel{(2x^2+1)}(4x))}{(2x^2+1)^{\cancel{4}}}$$

$$f'''(x) = \frac{120x^3-20x}{(2x^2+1)^3} \Rightarrow 120x^3-20x=0$$

$x_1 = 0$

$x_2 = -0{,}4082$

$x_3 = 0{,}4082$

$f''(-0{,}4082) = -5{,}6249$

$f''(0{,}4082) = (-5{,}6249) \to K$

$$n = \left|\sqrt{\frac{K(b-a)^3}{12(ET)}}\right| \leq 17{,}93 \simeq \boxed{18}$$

$ET = 10^{-2}$

$\Delta x = 0{,}105$

$\int f'(x) = \int -5/4 \ln(2x^2+1)$

$$f(x) = \int_{0,1}^{2} -\frac{5}{4}\left(x\ln(2x^2+1) + (\sqrt{2}\arctan(\sqrt{2}x) - 2x)\right) dx$$

$$f(x) = \frac{\Delta x}{2}\Big(f(x_0) + 2[f(x_1) + f(x_2) + f(x_3) + f(x_4) + f(x_5) + f(x_6) + f(x_7) + f(x_8) + f(x_9) +$$
$$f(x_{10}) + f(x_{11}) + f(x_{12}) + f(x_{13}) + f(x_{14}) + f(x_{15}) + f(x_{16}) + f(x_{17})] + f(x_{18})\Big]$$

$f(x) = \boxed{-1{,}66103}$

7.

$n = 6 \times 4 = 24$

$$L = \int_a^b \sqrt{1 + [f'(x)]^2}\, dx$$

$f(x) = e^{\sin(x)}$

$f'(x) = e^{\sin(x)} \cos(x)$

$$L = \int_0^6 \sqrt{1 + [e^{\sin x} \cos x]}\, dx$$

$$\Delta x = \frac{6-0}{24} = \frac{1}{4}$$

$L = 7,8637005$ -> Resultado exacto

$L = 7,8644606$ -> regla de simpson

8. $i(t) = (60-t)^2 + (60-t)\,\text{sen}(t^{1/2})$

$i(t) = t^2 - 120t + 3600 + 60\,\text{sen}(t^{1/2}) - t\,\text{sen}(t^{1/2})$

$i'(t) = 2t - 120 + 60\cos(t^{1/2})t^{-1/2} - (\text{sen}(t^{1/2}) + t\cos(t^{1/2})t^{-1/2})$

$i''(t) = 2 + (60 - \text{sen}(t^{1/2})t^{-1/2}t^{-1/2} + 60\cos(t^{1/2})t^{-3/2}) - \cos(t^{1/2})t^{-1/2} - (-\text{sen}(t^{1/2})t^{-1/2}t^{1/2} +$
$\cos(t^{1/2})t^{-3/2})$

$i''(t) = 2 - 60\,\text{sen}(t^{1/2})t^{-1} + 60\cos(t^{1/2})t^{-3/2} - \cos(t^{1/2})t^{-1/2} + \text{sen}(t^{1/2}) - \cancel{\cos(t^{1/2})t^{-3/2}}$

$i'''(t) = (-60\cos(t^{1/2})t^{-1/2}t^{-1} + (-60\,\text{sen}(t^{1/2})t^{-2}) + (-59\,\text{sen}(t^{1/2})t^{-1/2}t^{-3/2} + 59\cos(t^{1/2})t^{-5/2}) - (-\text{sen}(t^{1/2})t^{-1/2}t^{-1/2}$
$+\cos(t^{1/2})t^{-3/2})) + \cos(t^{1/2})t^{-1/2})$

$i'''(t) = -60\cos(t^{1/2})t^{-3/2} - 60\,\text{sen}(t^{1/2})t^{-2} - 59\,\text{sen}(t^{1/2})t^{-2} + 59\cos(t^{1/2})t^{-5/2} + \text{sen}(t^{1/2})t^{-1} + \cos(t^{1/2})t^{-3/2}$

[illegible] $t^{-1/2}t^{-3/2}$ [illegible] $9\,\text{sen}(t^{1/2})t^{-2} + 59\cos(t^{1/2})t^{-5/2} + \text{sen}(t^{1/2})t^{-1} + \cos(t^{1/2})t^{-1/2}$.

$$i^{(v)}(t) = -\left(-61\,\mathrm{sen}(t^{1/2})t^{-1/2}t^{-3/2} + 61\cos(t^{1/2})t^{-5/2}\right) - \left(119\cos(t^{1/2})t^{-1/2}t^{-2} + 119\,\mathrm{sen}(t^{1/2})t^{-3}\right) -$$

$$\left(-59\,\mathrm{sen}(t^{1/2})t^{-1/2}t^{-5/2} + 59\cos(t^{1/2})t^{-7/2}\right) + \left(\cos(t^{1/2})t^{-1/2-1} + \mathrm{sen}(t^{1/2})t^{-2}\right) +$$

$$\left(-\mathrm{sen}(t^{1/2})t^{-1/2-1/2} + \cos(t^{1/2})t^{-3/2}\right)$$

$$i^{(4)}(t) = \cancel{61\,\mathrm{sen}(t^{1/2})t^{-2} - 61\cos(t^{1/2})t^{-5/2} - 119\cos(t^{1/2})^{-5/2} - 119\,\mathrm{sen}(t^{1/2})t^{-3}} - 59\,\mathrm{sen}(t^{1/2})^{-3} +$$

$$59\cos(t^{1/2})t^{-7/2} + \cos(t^{1/2})t^{-3/2} + \cancel{\mathrm{sen}(t^{1/2})t^{-2}} - \mathrm{sen}(t^{1/2})t^{-1} + \cos(t^{1/2})t^{-3/2}$$

$$i^{(4)}(t) = 62\,\mathrm{sen}(t^{1/2})t^{-2} - 180\cos(t^{1/2})t^{-5/2} - 178\,\mathrm{sen}(t^{1/2})t^{-3} + 59\cos(t^{1/2})t^{-7/2} + 2\cos(t^{1/2}) -$$

Newton (a) Se uso metodo de newton para hallar el cero de la funcion $-\mathrm{sen}(t^{1/2})$

(b)

$$K = 4{,}7998$$

$$n = \left| \sqrt{\frac{K(b-a)^3}{12(E_T)}} \right| \qquad E_T = 10^{-2} \qquad \Delta x = \frac{b-a}{n} = \frac{16}{405}$$

$$n \leq 404{,}76 \approx \boxed{405}$$

$$f(x) = \int^{16} (60-t)^2 + (60-t)\,\mathrm{sen}(t^{1/2})\,dt$$

9. Encontrar Un n para Un Error menor 2×10^{-4}

$$f(x) = \frac{-1}{3}t^4 \ln(t) + \frac{7}{36}t^4 + \frac{1}{2}t^2$$

$$f'(x) = \frac{-4}{3}t^3 \ln(t) - \frac{1}{3}t^3 + \frac{7}{9}t^3 + t$$

$$= \frac{-4}{3}t^3 \ln(t) + \frac{4}{9}t^3 + t$$

$$f''(x) = -4t^2 \ln(t) \; \frac{-4}{3}t^2 + \frac{4}{3}t^2 + 1$$

$$= -4t^2 \ln(t) + 1$$

$$f'''(x) = -8t\ln(t) - 4t$$

Maximo

$$-4t(2\ln(t)+1) = 0$$

$$\ln(t) = -1/2$$

$$t = e^{-1/2}$$

$$f''(e^{-1/2}) = \underbrace{1,73575}_{K}$$

Encontrar n

$$E_T \leq \left| \frac{K(b-a)^3}{12n^2} \right| \rightarrow 2\times10^{-4} \left| \frac{1,73575(1,1-0,3)^3}{12n^2} \right|$$

$$n^2 \leq \frac{1,73575(0,512)}{2,4\times10^{-3}}$$

$$n = \sqrt{370,293} = 19,243$$

$$\boxed{n = 20}$$

10) $M = \int_{t_1}^{t_2} Q(t)c(t)\,dt$

$Q(t) = 9 + 4\cos^2(0{,}4t)$
$c(t) = 5e^{-0{,}5t} + 2e^{0{,}15t}$

$Q(t)^* c(t) = 45e^{-0{,}5t} + 18e^{0{,}15t} + 20\cos^2(0{,}4t)e^{-0{,}5t} + 8\cos^2(0{,}4t)e^{0{,}15t}$

$n = \left(\frac{2+8}{2}\right)^* 6 = \boxed{30}$ $\quad \Delta x = \frac{8-2}{30} = \frac{1}{5}$

$f(x) = \int_2^8 Q(t)^* c(t) \simeq \frac{1/5}{3}\Big[49{,}66 + 2^*(45{,}106 + 2(41{,}73 + 39{,}56 + 38{,}93 + 38{,}90 + 40{,}43$

$+ 43{,}19 + 47{,}10 + 52{,}03 + 57{,}75 + 64{,}002 + 70{,}44 + 76{,}72 + 82{,}48)$

$+ 4^*(47{,}23 + 43{,}27 + 40{,}50 + 38{,}98 + 38{,}6 + 39{,}51 + 41{,}66 + 45{,}01 + 49{,}45 + 54{,}8 + 60{,}83 + 67{,}22 +$
$73{,}62 + 79{,}69 + 85{,}07) + 87{,}42)$

$= 322{,}3483$