3/ Sacar V(x)
Calcular Wab
Comprobar si es campo conservativo.

$F = (x+y^3+z)\vec{i} + (y+z)\vec{j} + (x+3)\vec{k}$

$A(2,1,2)$, $B(3,-1,3)$

$F = -\frac{dv}{dr}$

$-V(x) = \int -F\,dx$; $V(x) = -\int (x+y^3+z)\,dx = -\left(\frac{x^2}{2} + y^3x + zx\right)$;

; $V(x) = \frac{-x^2}{2} - y^3x - zx + A_1$

$-V(y) = -\int F_y\,dy = -\int (y+z)\,dy = \frac{-y^2}{2} - zy + A_2$

$-V(z) = -\int F_z\,dz = -\int (x+3)\,dz = -xz - 3z + A_3$

$V(x,y,z) = \frac{-x^2}{2} - \frac{y^2}{2} - zx - y^3x - zy - 3z + C$

$V(x,y,z) = -\left(\frac{x^2+y^2}{2} + zx + y^3x + zy + 3z\right) + C$

$W_{AB} = -\Delta V(x,y,z)$

$V(a) = -\left(\frac{2^2+1^2}{2} + 2\cdot 2 + 1^3\cdot 2 + 2\cdot 1 + 3\cdot 2\right) + \cancel{C}^{0}$

$V(a) = -16'5\ J$

$V(b) = -\left(\frac{3^2+(-1)^2}{2} + 3\cdot 3 + (-1)^3\cdot 3 + 3\cdot(-1) + 3\cdot 3\right) + \cancel{C}^{0}$

$V(b) = -17\ J$

$V_{ab} = V_b - V_a = -17 - (-16'5) = -0'5\ J$

Comprobar si es campo conservativo.

$\text{Frot} = 0$; $\text{Frot} = \begin{vmatrix} i & j & k \\ d/dx & d/dy & d/dz \\ f_x & F_y & F_z \end{vmatrix} = \vec{i}\left(\frac{dF_z}{dy} - \frac{dF_y}{dz}\right) - \vec{j}\left(\frac{dF_z}{dx} - \frac{dF_z}{dz}\right) +$

$+\left(\vec{k}\left(\frac{dF_y}{dx} - \frac{dF_x}{dy}\right)\right) = (0-1)\vec{i} - (1-1)\vec{j} + (0+3y^2)\vec{k}$

$\text{rot } F \neq 0 \Rightarrow \bar{f}$ no conservativo $\longrightarrow \nexists V(x,y,z)$.

4/ Ptos de eq. Hipótesis $m = 1\,kg$.

V(x) y estabilidad

$V(0) = 0$, $x_0 = 0'5\,m$, $V_0 = 0'2\,m/s$

$\bar{f} = x - x^3 \longrightarrow$ conservativo (si solo hay una función)

$E_0 = V_0 + \frac{1}{2} m v_0^2$

$F = x - x^3 = -\frac{dv}{dx}$

$\int_0^{V(x)} dv = -\int \bar{f}\,dx = -\int (x - x^3)\,dx$

$V(x) = \int -x\,dx + \int x^3\,dx = \frac{-x^2}{2} + \frac{x^4}{4}$; $V(x) = -\frac{x^2}{2} + \frac{x^4}{4}$

Extremos del mov.

$E_0 = V_0 + T_0 = V(x = 0'5) + T(v = 0'2)$

$E_0 = \frac{-0'5^2}{2} + \frac{0'5^4}{4} + \frac{1}{2} m (0'2)^2 \Rightarrow E_0 = -0'0893\,J$

$-0'0893 = \frac{-x^2}{2} + \frac{x^4}{4} = \frac{-2x^2 + x^4}{4}$

$-0'3575 = -2x^2 + x^4 \Rightarrow x^4 - 2x^2 + 0'3575 = 0$

$\alpha_1 = 1'34\,m$

$x_2 = -1'34\,m$

Estabilidad y ptos de eq.