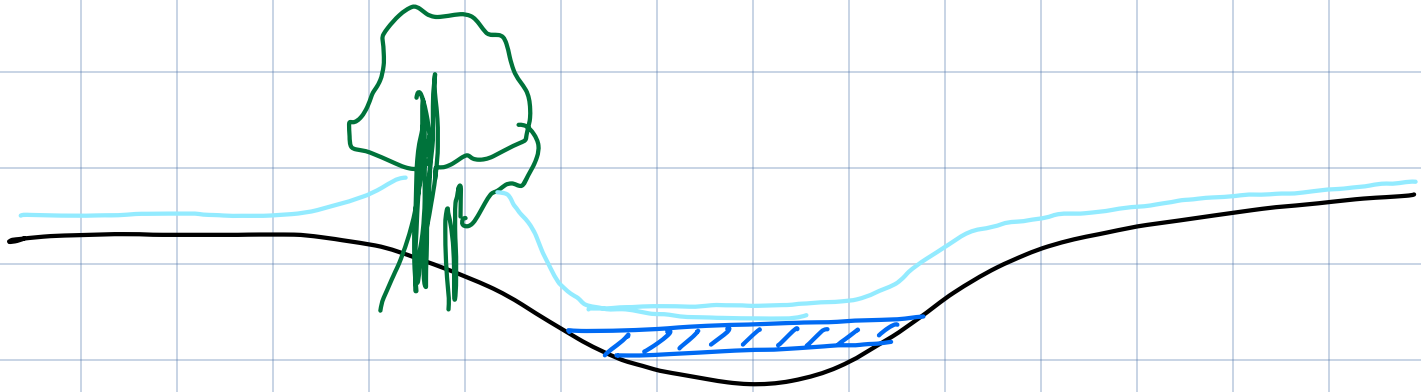
Ex 1. SWE Distribution.



Average SWE = 135.8 mm

Ex 2. SWE = 30 mm $z_s = 0.15$ m

$T_s = -7°C$

$j_{net} = 10\ W/m^2$

i) Snow density $\rho_s = \frac{M_s}{V_s}$

SWE = 30 mm = 0.03 m SWE. $\rho_L = 0.03 \times 1000 = 30\ kg/m^2$

$V_s = z_s . A = 0.15 \times A$

$M_s = 30 \times A$

$\rho_s = \frac{30 \times A}{0.15 \times A} = \frac{30}{0.15} = 200\ kg/m^3$

ii) $M_L = 0$ g because $T = -7°C$

$M_I = M_s = 30 \text{ kg/m}^2$

iii) $\Delta U_s = M_i \cdot C_{pi} \cdot \Delta T$ $\qquad C_{pi} = 2100 \text{ J/kg/k}$

$= 30 \times 2100 \times 7$

$= 441000 \text{ J/m}^2$

$= \underline{0.441} \text{ MJ/m}^2$ ~ energy to get the snow to 0°C.

iv) Excess energy? → Energy applied − energy to get to 0°C

Energy applied = $10 \text{ W/m}^2 = 10 \text{ J/s/m}^2$

$10 \times 86400 = 864000 \text{ J/m}^2$

$= \underline{0.864 \text{ MJ/m}^2}$

Excess = $0.864 - 0.441 = \underline{0.423 \text{ MJ/m}^2}$

How much snow melts? $\Delta U_L = -\lambda \cdot \Delta m_i$

$\lambda = 0.334 \text{ MJ/kg}$

$\Delta m_i = \dfrac{0.423}{0.334} = 1.27 \text{ kg}$

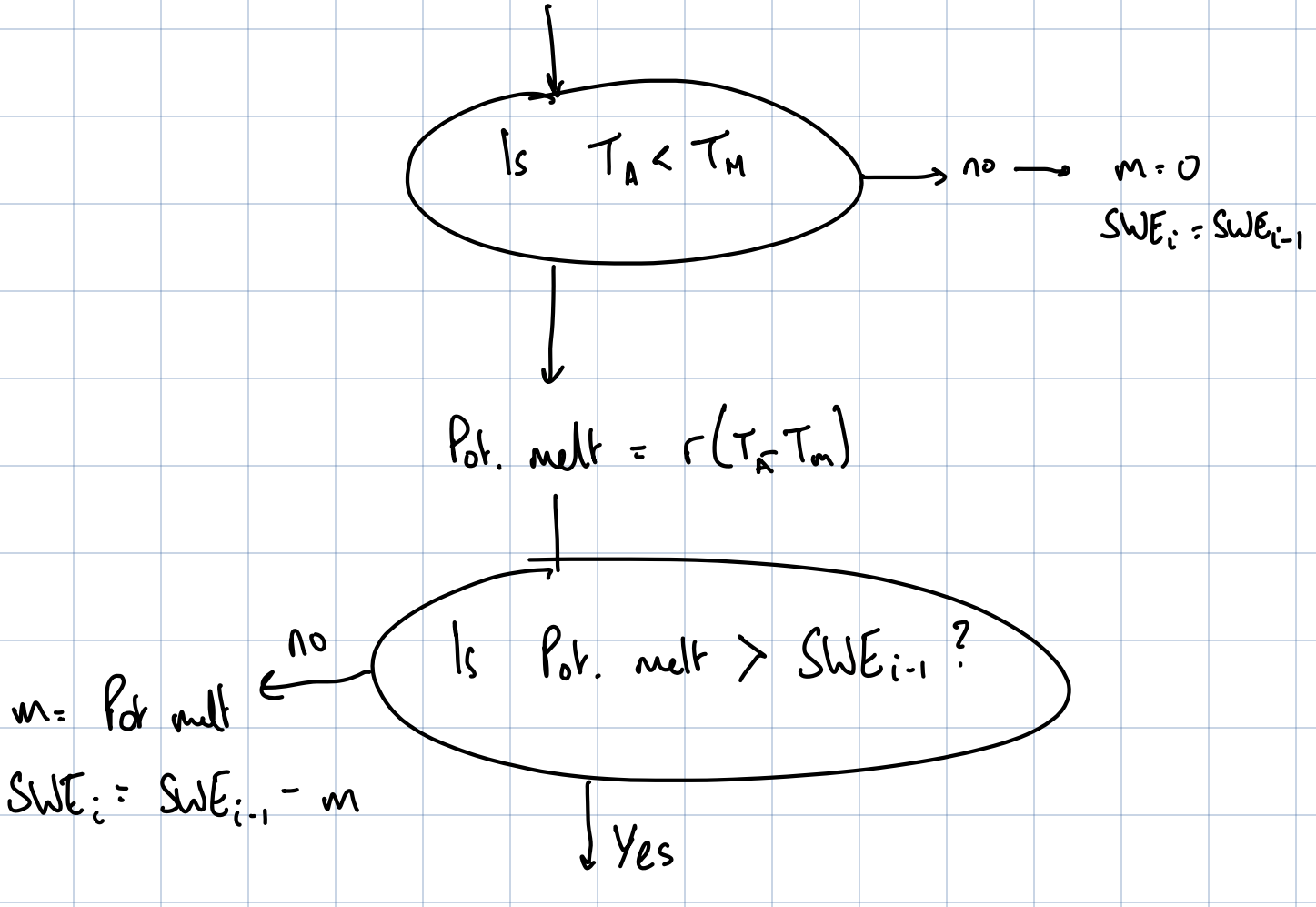
$m_I = 30 \text{ kg/m}^2 \rightarrow 30 - 1.27 = \underline{28.73 \text{ kg/m}^2}$

v) $m_I = 28.73 \ kg/m^2$
$m_L = 1.27 \ kg/m^2$
$T = 0°C$
} Final State ✓

Ex 3.

$m(t) = r(T_A(t) - T_m)$ if $T_A(t) \geq T_m$
$m(t) = 0$ $T_a(t) < T_m$

potential melt



$SWE_i = 0$