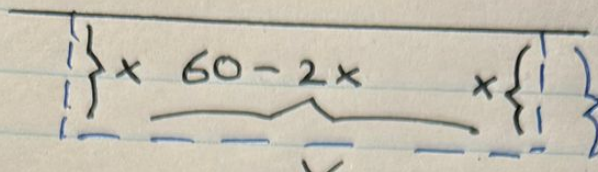
1.)



Area = x.y

$= x(60-2x) \rightarrow 60x-2x^2 > 0$

$\div -2 / -2x^2+60x > 0$

$x(x-30) < 0 \iff x^2-30x < 0$

$y = 0 = x(x-30)$ when $x=0$ or $x=30$

requirement: $x \in [2,30]$

therefore; Area: $60x-2x^2$

Critical Point:

$\frac{d}{dx}$ Area $= 60-4x = 0$ when $x=15$

$*60.2-2(2^2) = 112$

$*60.30-2(30^2) = 0$

$*60.15-2(15^2) = 450 = max$

2.) $V = \underbrace{999.87}_{d} - \underbrace{0.06426T}_{cT} + \underbrace{0.000850437T^2}_{bt^2} - \underbrace{0.0000679T^3}_{at^3}$

$V = -aT^3+bT^2-cT+d$ $\quad \frac{dV}{dx} = -3at^2+bt-c = 0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} \quad \frac{-2b \pm \sqrt{4b^2-12ac}}{-6a}$

$\frac{dv}{dx} = 0.0002037T^2 - 0.0170086T + 0.06426 = 0$

plug the values into quadratic formula then:

range of 0°C to 30°C 3.94°C

$max = 3.94 \in [0,30]$