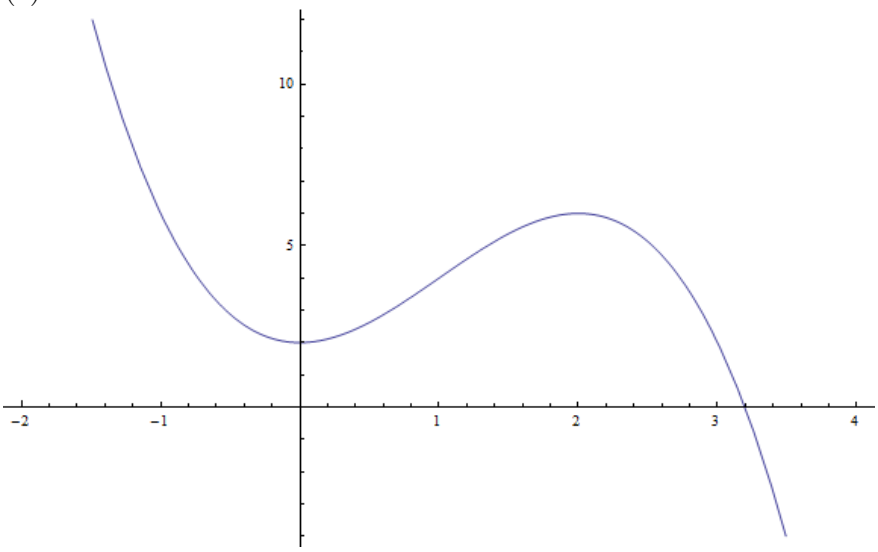
1. maximum value $= 27$, attained at $x = 2$
minimum value $= -1$, attained at $x = 0$

2. (a) increasing on $[0, 2]$
decreasing on $(-\infty, 0]$ and $[2, \infty)$
local minimum at $(x, y) = (0, 2)$
local maximum at $(x, y) = (2, 6)$
(b) concave up on $(-\infty, 1]$
concave down on $[1, \infty)$
inflection point at $(x, y) = (1, 4)$
(c)



3. minimum cost $= \$270$, attained when the dimensions are $3\text{m} \times 6\text{m} \times \frac{10}{9}\text{m}$.

4. $s(t) = t^5 - 2t^3 + t$

5. (a) 28/15
(b) 10
(c) 0
(d) $-\frac{1}{2}e^{-t^2} + C$
(e) $\ln(\ln s) + C$