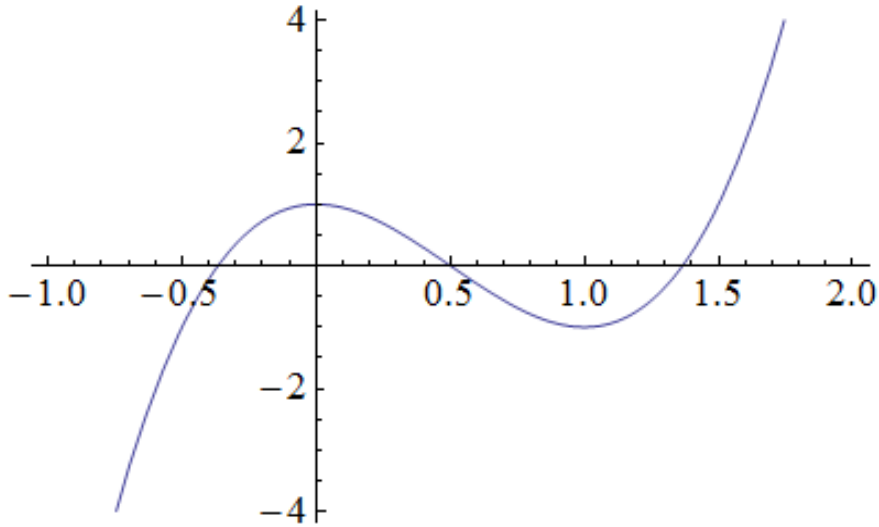


1. (i) critical numbers: $0, \frac{1}{2}, 1$
 (ii) absolute maximum: 4 absolute minimum: 0
2. (a) increasing: $(-\infty, 0]$ and $[1, \infty)$ decreasing: $[0, 1]$
 (b) concave up: $[\frac{1}{2}, \infty)$ concave down: $(-\infty, \frac{1}{2}]$
 inflection point at $(x, y) = (\frac{1}{2}, 0)$
 (c) $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow -\infty} f(x) = -\infty$
 (d)



(e) 3 roots

3. minimum cost: \$270, attained when the dimensions are $3\text{m} \times 6\text{m} \times \frac{10}{9}\text{m}$
4. (i) $s(t) = t^5 - \frac{5}{2}t^4 + \frac{5}{3}t^3 - \frac{1}{6}t$
 (ii) $v(0) = -\frac{1}{6}$
5. (a) $\frac{28}{15}$
 (b) 10
 (c) 0
 (d) $-\frac{1}{2}e^{-t^2} + C$
 (e) $\ln |\ln s| + C$