

**EX 4.1.1:** Let  $f(x) = 4 - x^2$

(a) Find all critical numbers of  $f(x)$ .

(b) Find the absolute extrema of  $f(x)$  over the closed interval  $x \in [-3, 2]$ .

(c) Find the absolute extrema of  $f(x)$  over the closed interval  $x \in [0, 10]$ .

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**EX 4.1.2:** Let  $g(w) = \sqrt[3]{w}$

(a) Find all critical numbers of  $g(w)$ .

(b) Find the absolute extrema of  $g(w)$  over the closed interval  $w \in [-1, 2]$ .

**EX 4.1.3:** Let  $r(\theta) = \sin^2(2\theta)$

(a) Find all critical numbers of  $r(\theta)$ .

(b) Find the absolute extrema of  $r(\theta)$  over the closed interval  $\theta \in [-\pi/2, \pi/2]$ .

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**EX 4.1.4:** Let  $h(x) = \begin{cases} -3x & , \text{if } x \leq 0 \\ x^2 & , \text{if } x > 0 \end{cases}$

(a) Find all critical numbers of  $h(x)$ .

(b) Find the absolute extrema of  $h(x)$  over the closed interval  $x \in [-3, 2]$ .