Lesson 5.1.2

5-13. See below:

a. $V'(x) = 0$; yes, unless the maximum occurs at the endpoints of the domain. Since cubic functions do not have cusps, non-differentiability is not an issue.

b. Students use their calculators.

c. Students will probably answer, set $f'(x) = 0$ and solve for x then use that value to evaluate y.

d. Answers will vary, but expect discussion involving using the first derivative.

e. The derivative of $f(x)$ does not exist at $x = 0$, which is the minimum value. You must check for $f'(x) = 0$ and $f'(x)$ DNE to find all local extrema.

Review & Preview

5-14. See below:

a. $r = \frac{x}{2\pi}$, $h = 25 - x$

b. $V = \frac{1}{4\pi}(25x^2 - x^3)$

c. $x = \frac{50}{3}$ cm, $V \approx 184.207\,\text{cm}^3$

5-15. See below:

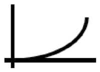
a. 2

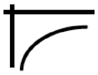
b. 0

c. $280x^6 - 216x^{-10}$

5-16. local max at $x = 2$, local min at $x = 3$, no point of inflection, increasing on $(-\infty, 2)$ and decreasing on $(2, 3)$; concave down on $(-\infty, 2)$ and concave up on $(2, \infty)$

5-17. It describes acceleration. In the first graph the velocity is increasing, while the velocity is decreasing in the second. Acceleration is positive in the first, negative but increasing in the second.

a. 

b. 

5-18. See below:

a. $\frac{1}{2}m^2 + 2m^{-1} - \frac{1}{4}m^{-4} + C$

b. $6 - \sqrt{11}$

c. 0

5-19. See below:

a. 0

b. $45\frac{1}{4}$

5-20. See below:

a. $y = \frac{a}{c}$

b. Answers vary. Sample solution: $y = \frac{3x+1}{x+5}$