

Details of Class Examples

Spring 2007 Math 163A Section A06 (Barsamian)

----- Details from Friday, May 18, 2007 Lecture -----

Details for finding derivative of $f(x) = 6x - 7x^{2/3}$.

$$\begin{aligned}
 f'(x) &= \frac{d}{dx} \left(6x - 7x^{2/3} \right) \\
 &= 6 \frac{d}{dx} (x) - 7 \frac{d}{dx} \left(x^{2/3} \right) \\
 &= 6(1) - 7 \left(\frac{2}{3} x^{2/3-1} \right) \\
 &= 6 - \frac{14}{3} x^{-1/3} \\
 &= 6 - \frac{14}{3} \frac{1}{x^{1/3}}
 \end{aligned}$$

Details for Exercise 6.1#27. In this problem, $f(x) = 2x + \frac{8}{x^2} + 1$.

Here are the details of the derivative calculation

$$\begin{aligned}
 f'(x) &= \frac{d}{dx} \left(2x + \frac{8}{x^2} + 1 \right) \\
 &= \frac{d}{dx} (2x + 8x^{-2} + 1) \\
 &= 2 \frac{d}{dx} (x) + 8 \frac{d}{dx} (x^{-2}) + \frac{d}{dx} (1) \\
 &= 2(1) + 8(-2x^{-3}) + (0) \\
 &= 2 - \frac{16}{x^3}
 \end{aligned}$$

To find the critical numbers, we set $f'(x) = 0$ and solve for x . Here are the details.

$$0 = 2 - \frac{16}{x^3}$$

$$\frac{16}{x^3} = 2$$

$$16 = 2x^3$$

$$8 = x^3$$

$$2 = x$$

Here are the details of the second derivative calculation

$$\begin{aligned}f''(x) &= \frac{d}{dx}(f'(x)) \\&= \frac{d}{dx}\left(2 - \frac{16}{x^3}\right) \\&= \frac{d}{dx}(2 - 16x^{-3}) \\&= 2\frac{d}{dx}(1) - 16\frac{d}{dx}(x^{-3}) \\&= 2(0) - 16(-3x^{-4}) \\&= \frac{48}{x^4}\end{aligned}$$
