
Section 2.3

[18] The cost function is $C = 104,000 + 7200x$. Marginal cost for producing x units is $\frac{dC}{dx} = 7200$ dollars.

[20] The cost function is $C = 100(9 + 3\sqrt{x})$. Marginal cost for producing x units is $\frac{dC}{dx} = 100 \times \frac{3}{2\sqrt{x}} = \frac{150}{\sqrt{x}}$ dollars.

[24] The revenue function is $R = 50(20x - x^{3/2})$. Marginal cost for producing x units is $\frac{dR}{dx} = 50\left(20 - \frac{3}{2}x^{1/2}\right) = 25(40 - 3\sqrt{x})$ dollars.

[28] The profit function is $P = -0.5x^3 + 30x^2 - 164.25x - 1000$. Marginal profit for producing x units is $\frac{dP}{dx} = -1.5x^2 + 60x - 164.25$ dollars.

Quiz 3, Problem 1

Problem: Using product rule and chain rule find the derivative of $f(x) = e^{x^3}\tan x^2$.
Solution:

$$\begin{aligned}
f'(x) &= \frac{d}{dx}[e^{x^3}]\tan x^2 + e^{x^3}\frac{d}{dx}[\tan x^2] \quad \text{(product rule)} \\
&= e^{x^3}\frac{d}{dx}[x^3]\tan x^2 + e^{x^3}\sec^2 x^2\frac{d}{dx}[x^2] \quad \text{(chain rule)} \\
&= 3x^2e^{x^3}\tan x^2 + 2xe^{x^3}\sec^2 x^2 \\
&= xe^{x^3}(3x\tan x^2 + 2\sec^2 x^2).
\end{aligned}$$