

Name: SOLUTIONS

Sec. 3.1 - Derivatives of polynomials and exponential function

Math 251

1. Find the derivative of $f(v) = \frac{\sqrt[3]{v} - 2ve^v}{v}$

We can write $f(v)$ as $\frac{v^{\frac{1}{3}}}{v} - \frac{2ve^v}{v} = v^{\frac{1}{3}-1} - 2e^v = v^{-\frac{2}{3}} - 2e^v$

So that

$$\begin{aligned} f'(v) &= -\frac{2}{3}v^{-\frac{2}{3}-1} - 2e^v \\ &= -\frac{2}{3}v^{-\frac{5}{3}} - 2e^v \end{aligned}$$

2. Show that the curve $y = 2e^x + 3x + 5x^3$ has no tangent line with slope 2

$$y' = 2e^x + 3 + 15x^2$$

Since $2e^x > 0$ for all x and $15x^2 \geq 0$, y' is always greater than 3

So it is not possible to have a tangent line of slope 2.