Math 2315 - Calculus II

Quiz #2 - 2010.02.03

Solutions

---

1. Compute the following derivative:

$$\frac{d}{dt}\ln\left(\frac{6t^3-4t^2+5t-9}{(3t+1)(4t^2+2t-3)}\right)$$

We will use logarithmic differentiation techniques:

$$\begin{aligned}\frac{d}{dt}\ln\left(\frac{6t^3-4t^2+5t-9}{(3t+1)(4t^2+2t-3)}\right) &= \frac{d}{dt}\left[\ln\left(6t^3-4t^2+5t-9\right)-\ln\left(3t+1\right)-\ln\left(4t^2+2t-3\right)\right]\\ &= \frac{12t^2-8t+5}{6t^3-4t^2+5t-9}-\frac{3}{3t+1}-\frac{8t+2}{4t^2+2t-3}\end{aligned}$$

2. Compute the following integral:

$$\int x\,e^{2x^2-4}\,dx$$

Setting $u=2x^2-4$, $du=4x\,dx$ and therefore $\dfrac{du}{4}=x\,dx$:

$$\begin{aligned}\int x\,e^{2x^2-4}\,dx &= \frac{1}{4}\int e^u\,du\\ &= \frac{1}{4}\,e^u+C\\ &= \frac{1}{4}\,e^{2x^2-4}+C\end{aligned}$$