

Calculus Quiz 9

1. (5 pts) *This example shows that the Newton's method can not apply when the root has vertical tangent. The approximation does not converge and will getting worse and worse.*

Apply Newton's method to $f(x) = x^{\frac{1}{3}}$ with $x_0 = 1$ and calculate x_1, x_2, x_3 , and x_4 . Find a formula for $|x_n|$. What happen to $|x_n|$ as $n \rightarrow \infty$?

2. (5 pts) Since raindrops grow as they fall, their surface area increases and therefore the resistance to their falling increases. A raindrop has an initial downward velocity of 10 m/s and its downward acceleration is

$$a = \begin{cases} 9 - 0.9t & \text{if } 0 \leq t \leq 10 \\ 0 & \text{if } t > 10 \end{cases}$$

If the raindrop is initially 500 m above the ground, how long does it take to fall?