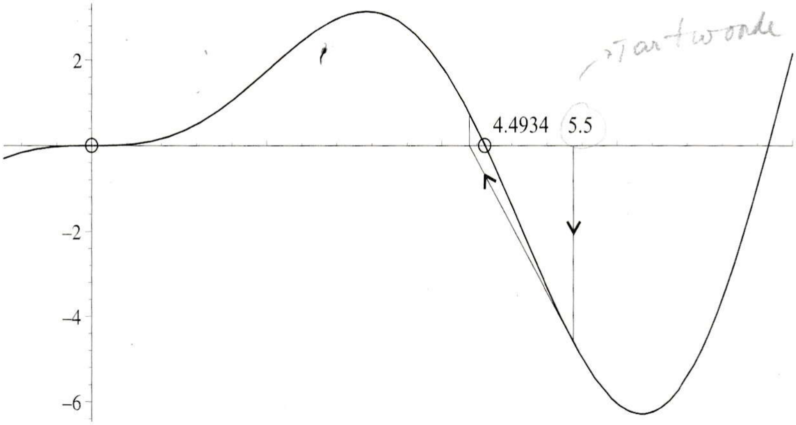

Figure 3.9: *For initial approximation* $x_0 = 5.5$, *Newton's method converges to the root* $r \approx 4.4934$.

(i) (Right-Hand Rule) For the ith rectangle on the interval $[x_{i-1}, x_i]$, use the value $f(x_i)$ at the right-hand endpoint for the height of the rectangle.

(ii) (Midpoint Rule) For the ith rectangle on the interval $[x_{i-1}, x_i]$, use the value $f(m_i)$ at the midpoint $m_i = (x_{i-1} + x_i)/2$, for the height of the rectangle.

Apply your code to the functions that you are assigned from the following.

(a) $f(x) = x^2 - x^4 + 1$ on the interval $[0, 1]$ (this is from Example 3.2).

(b) $f(x) = 1 + x^{\sin x}$ on the interval $[1, 5]$.

(c) $f(x) = 1 + e^{-x} \sin 10x$ on the interval $[0, 2]$.

(d) $f(x) = 1 + \sin 10x \, \sin x$ on the interval $[0, 2]$.

In each case, do the Riemann sum approximations and graphics for $N = 10, 30, 50, 100$. Annotate your graphics with the value of N and the corresponding value of the approximating Riemann sums. Use Maple to compute a good floating-point approximation to the true value of the definite integral. If you are assigned (c) or (d), compute the exact value by hand. Show your work!

3. **(Alternating Series)** At the end of the discussion in Example 3.3, we made the claim that the alternating series being studied numerically had an exact value for its sum:

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n(n+1)} = 2 \ln 2 - 1.$$