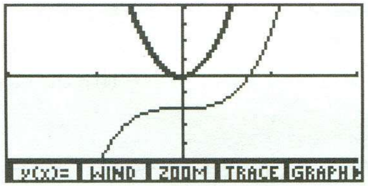
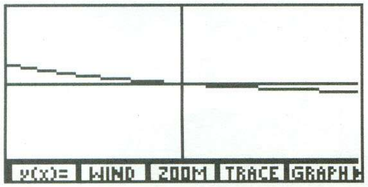
Chapter 5

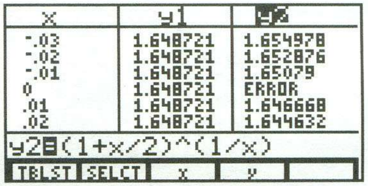
1. Let $y1 = 20x\text{^}3 + 2x^2 - 10$ and $y2 = \mathbf{der1}(y1, x)$. In the figure below, $y1$ is graphed in the Line style and $y2$ is graphed using the Thick style. It is straightforward to zoom in on the graph of $y2$ and use ROOT to find the roots of $y2$ are 0 and $-.066666666667$.

   Consequently, $y1$ has a local maximum at $x = -.066666666667$ and a local minimum at $x = 0$.



2.





x	y1	y2
-.03	1.648721	1.654978
-.02	1.648721	1.652876
-.01	1.648721	1.65079
0	1.648721	ERROR
.01	1.648721	1.646668
.02	1.648721	1.644632

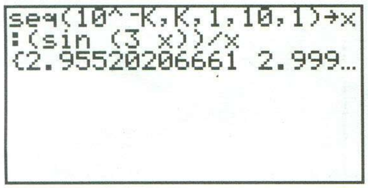
y2=(1+x/2)^(1/x)

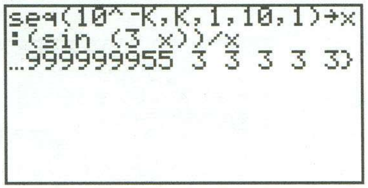
TBLST SELCT x y

3. The Animate style for $y4$ dynamically traces along the graph of $y3$ graphically indicating that $y4$ and $y3$ are equal.

4. Graph $y1 = \mathbf{der1}\left(x\text{^}3 + 1.5x^2 - 8x + 2,\ x\right)$ and $y2 = 10$ on $[-5, 5, 1] \times [-12, 14, 2]$ and then use ⟨**ISECT**⟩ to find that $x^3 + 1.5x^2 - 8x + 2$ has slope 10 at the points where $x = -3$ and $x = 2$.

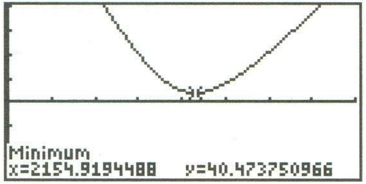
5. The following screen images similar to (5.3.3) and (5.3.4) suggest a limit value of 3.





Exercise Solutions *(Continued)*

6. After graphing the function in question on the window [0, 4000, 500] × [–300, 400, 100] and using ⟨**FMIN**⟩, the following screen was obtained:



7. Take $y1$ = **der1**(3^x, x) and $y2 = (y1(x + 0.1))/y1(x)$. Now use TABLE with **TblStart** = 0 and **ΔTbl** = 1 to obtain the first figure below. Knowing an exponential function has the form of $A\,B^x$ leads to the home screen computation shown in the second figure and the eventual conjecture that the exact derivative of 3^x is $3^x \ln 3$.