Practice Exercise
Week #2 (part 1)

The even-numbered problems are selected from the required textbook. The answers to these problems are given in a separate file. The link to the answers to next to the link to this file.

Section 1.4.

Complete the following parts for each given function

a) *Graph the function.*
b) *Draw lines tangent to the graph at the points with x-coordinates* -2, 0, *and* 1.
c) *Find* $f'(x)$ *by determining* $\lim_{h\to 0} \dfrac{f(x+h)-f(x)}{h}$.
d) *Find* $f'(-2)$, $f'(0)$, *and* $f'(1)$. *These slopes should match those of the lines you drew in part* (b).

14. $f(x) = 5x^2 - 2x + 7$

16. $f(x) = \dfrac{1}{x}$

Find the equation of the tangent line based on given conditions

20. Find an equation of the line tangent to the graph of $f(x) = -1/x$ at **(a)** $(-1, 1)$; **(b)** $(2, -\frac{1}{2})$; **(c)** $(-5, \frac{1}{5})$.

22. Find an equation of the line tangent to the graph of $f(x) = 4 - x^2$ at **(a)** $(-1, 3)$; **(b)** $(0, 4)$; **(c)** $(5, -21)$.

Find the derivative of the following functions

46. $f(x) = x^5$

48. $f(x) = \sqrt{x}$

50. $f(x) = \dfrac{1}{\sqrt{x}}$

58. Let F be a function given by

$$F(x) = \begin{cases} x^2 + 1, & \text{for } x \leq 2, \\ 2x + 1, & \text{for } x > 2. \end{cases}$$

a) Verify that F is continuous at $x = 2$.
b) Is F differentiable at $x = 2$? Why or why not?

60. Let H be a function given by

$$H(x) = \begin{cases} 2x^2 - x, & \text{for } x \leq 3, \\ mx + b, & \text{for } x > 3. \end{cases}$$

Determine the values of m and b that make H differentiable at $x = 3$.

62. Let $f(x) = -x^3$ over $[0, 5]$. Find c such that $0 < c < 5$, where $f'(c) = \dfrac{f(5) - f(0)}{5 - 0}$.