1. Reading assignment for Section 2.1:
   (1) Figures 2.4-2.6.
   (2) Formula (1.1) and Definition 1.1.
   (3) Examples 1.1-1.2 and 5 examples given in the lecture notes.

1. *Find the equation of the line passing through points (−1, 2) and (1, 5) using
   (1) the slope-point form;
   (2) the slope-intercept form.

   \[ m = \frac{5 - 2}{1 + 1} = \frac{3}{2} \]

   (1) the slope-point form;
   \[ y - 2 = \frac{3}{2}(x + 1), \; y = \frac{3}{2}x + \frac{3}{2} + 2 = \frac{3}{2}x + \frac{7}{2} \]

   (2) the slope-intercept form.
   \[ y = \frac{3}{2}x + b, \; 2 = \frac{3}{2}(-1) + b, \; b = 2 + \frac{3}{2} = \frac{7}{2}, \; y = \frac{3}{2}x + \frac{7}{2} \]

2. The graph of \( f(x) \) is given below.
   a. Sketch the secant line that passes through points on the graph of \( f(x) \) where \( x = -3 \) and \( x = -2 \).
   b. Sketch the tangent lines to the graph of \( f(x) \) at points where \( x = 0 \), and \( x = -2 \), respectively.
   c. Estimate all \( x \) values at which the slope of the tangent line to the curve \( y = f(x) \) is 0.
   d. Extra points: Estimate intervals over which the slope tangent line is positive.

   c. \( x = -2 \)
      \[ x = 1.25 \]
      \[ x = -0.5 \]

   d. \((-\infty, -2)\)
      \((-0.5, 1.25)\)

   *19, *21, *23
19. \( f(x) = x^2 - 3x, \ a = -2 \)

(1) \( f(-2) = (-2)^2 - 3(-2) = 10 \)

(2) \[
\frac{f(-2 + h) - f(-2)}{h} = \frac{(-2 + h)^2 - 3(-2 + h) - 10}{h} = 4 - 4h + h^2 + 6 - 3h - 10
\]
\[
= h(h - 7) = h - 7
\]

(3) \( m_{\tan} = \lim_{h \to 0} \frac{f(-2 + h) - f(-2)}{h} = \lim_h (h - 7) = -7 \)

(4) \( y - 10 = (-7)(x + 2), \ y = -7x - 4 \)

21. \( f(x) = \frac{2}{x + 1}, \ x = 1 \)

(1) \( f(1) = \frac{2}{2} = 1 \)

(2)
\[
\frac{f(1 + h) - f(1)}{h} = \frac{\frac{2}{1 + h + 1} - 1}{h} = \frac{\frac{2 - 2 - h}{2 + h}}{h} = \frac{1}{h} \left( \frac{-h}{2 + h} \right) = \frac{-1}{2 + h}
\]

(3) \( m_{\tan} = \lim_{h \to 0} \frac{f(1 + h) - f(1)}{h} = \lim_{h \to 0} \left( \frac{-1}{2 + h} \right) = \frac{-1}{2} \)

(4) \( y - 1 = \left( -\frac{1}{2} \right)(x - 1), \ y = -\frac{1}{2}x + \frac{3}{2} \)

23. \( f(x) = \sqrt{x + 3}, \ a = -2 \)

(1) \( f(-2) = \sqrt{-2 + 3} = 1 \)

(2)
\[
\frac{f(-2 + h) - f(-2)}{h} = \frac{\sqrt{(-2 + h) + 3} - 1}{h} = \frac{\sqrt{h + 1} - 1}{h} \left( \frac{\sqrt{h + 1} + 1}{\sqrt{h + 1} + 1} \right) = \frac{h + 1 - 1}{h(\sqrt{h + 1} + 1)} = \frac{1}{\sqrt{h + 1} + 1}
\]

(3) \( m_{\tan} = \lim_{h \to 0} \frac{f(-2 + h) - f(-2)}{h} = \lim_{h \to 0} \frac{1}{\sqrt{h + 1} + 1} = \frac{1}{2} \)

(4) \( y - 1 = \frac{1}{2}(x + 2) \)