1. (15 pts) If the parabola \( y = 2x^2 - 13x + 5 \) has a tangent line of slope \(-1\) at some point, find the point of tangency and the equation of the tangent line.

slope of the line \( -1 \) \( \Rightarrow \) \( f'(x) = -1 \)

\[ 4x - 13 = -1 \]

\[ 4x = 12 \]

\[ x = 3 \]

point of tangency \( (3, f(3)) = (3, 2(3)^2 - 13(3) + 5) = (3, 16) \)

eq of tan line : \( \frac{y - y_1}{x - x_1} = m \) \( \text{or} \) \( \frac{y - 16}{x - 3} = -1 \)

2. (pts) For \( f(x) = \sqrt{x-2} \) on \( [2, 6] \), find the value \( c \) that the MVT says must exist.

MVT: \( f'(c) = \frac{f(b) - f(a)}{b - a} \)

\[ \left. \left( x - 2 \right) \right|_{x = c} = \frac{\sqrt{6-2} - \sqrt{2-2}}{6-2} = \frac{2 - 0}{4} = \frac{1}{2} \]

\[ \frac{1}{2} (x-2)^{1/2} \bigg|_{x = c} = \frac{1}{2} \]

\[ x_0 = c \]

\[ \sqrt{c-2} = 1 \]

\[ c - 2 = 1 \]

\[ c = 3 \]

3. (pts) Explain how you would solve \( \sin t = 3t + e^{-5} \) by:

- providing the form you would work with: \( f(t) = \sin t - 3t - e^{-5} \)
- stating what you would look for: find roots (zeros) of \( f(t) \)
- writing down the algorithm you would use: \( x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} \)
- providing the first approach to the answer: \( f(0) = 0 - 0 - 1 + 5 = 4 \)

\[ \text{let } x_0 = 0 \]