1. Let \( f(x) = (x - 3)^{3/2} - \sqrt{25 - x^2} \) defined for \( 3 \leq x \leq 5 \). Does \( f(x) \) have a local maximum value or does \( f(x) \) have a local minimum value at the end point \( x = 3 \). 

2. Let \( f(x) = (x + 4)^{3/2} - 3x \) for \( x \geq -4 \). Find the values of \( x \) for which \( f(x) \) has a local maximum value and the values of \( x \) for which \( f(x) \) has a local minimum value.

3. Let \( f(x) = (16 - x^2)^{-2/3} \) for \( x \neq -4 \) and \( x \neq 4 \). Find the values of \( x \) for which \( f(x) \) has a local maximum value and the values of \( x \) for which \( f(x) \) has a local minimum value.

4. Let \( f(x) = x + (4/x) \) for \( x > 0 \). Find the values of \( x \) for which \( f(x) \) has a local maximum value and the values of \( x \) for which \( f(x) \) has a local minimum value.
5974 Second Derivative Test

1. Find the critical points for the function \( f(x) = 10 + 60x + 9x^2 - 2x^3 \). Classify these critical points as values of \( x \) where either \( f(x) \) has a local maximum value or values of \( x \) where the function \( f(x) \) has a local minimum value using the second derivative test.

2. Consider the function \( f(x) = x^{8/3} - 16x^{5/3} \). Same instructions as problem 1.

3. The function \( f(x) \) is continuous and has the following properties:
   a) \( f'(-4) = 0 \), \( f'(2) = 0 \), \( f'(8) = 0 \), \( f''(-1) = 0 \) and \( f''(5) = 0 \).
   b) \( f''(x) > 0 \) if \( x < -1 \) and if \( x > 5 \). Also \( f''(x) < 0 \) if \( -1 < x < 5 \).

   Find the critical points for \( f(x) \). Use the second derivative test to determine for which values of \( x \) the function \( f(x) \) has a local maximum value and for which values of \( x \) the function \( f(x) \) has a local minimum value.
5975 Functions Given by Conditions

1. The function \( f(x) \) is continuous and has all the following properties:

   (a) \( f'(-2) = DNE \), \( f'(3) = 0 \), \( f'(4) = DNE \), \( f'(5) = 0 \), \( f''(-2) = DNE \), \( f''(3) = 0 \), \( f''(4) = DNE \), and \( f''(5) > 0 \).

   (b) \( f'(x) > 0 \) for \(-2 < x < 3\) and for \(3 < x < 5\). Also \( f'(x) < 0 \) for \(x < -2\) and for \(x > 5\).

   (c) \( f''(x) > 0 \) for \(x < -2\) and for \(3 < x < 4\). Also \( f''(x) < 0 \) for \(-2 < x < 3\) and for \(x > 4\).

   Find the critical points for \( f(x) \). Use the first derivative test to determine for which values of \(x\) the function \( f(x) \) has a local maximum value and which give a local minimum. Also test critical points using second derivative test.

2. On the coordinate axis below sketch the graph of a function \( f(x) \) which is continuous and has all the properties listed.

   a) \( f'(x) > 0 \) for \(-8 < x < -3\) and for \(x > 5\). Also \( f'(x) < 0 \) for \(-3 < x < 5\).

   b) \( f''(x) > 0 \) for \(-8 < x < -3\) and for \(1 < x < 10\). Also \( f''(x) < 0 \) for \(-8 < x < -3\), for \(-3 < x < 1\) and for \(x > 10\).