Find the extreme values of \( f \) on the given interval. Determine at which numbers in the interval they occur.

1) \( f(x) = 3x^3 - 9x + 4 \); \([-2, 3]\]

Abs. max. value  
Abs. min. value

2) \( f(x) = x^{3/2} + 3 \); \([-32, 1]\]

Abs. max. value

Abs. max. occurs at

Abs. min. occurs at

3) Find the relative max. and min. and the intervals on which the given function is increasing and those on which it is decreasing. \( f(x) = x(x - 10)^3 \)

rel. max.

rel. min.

inc.

dec.

4) Find any inflection point and the intervals on which the function is concave upward and those on which it is concave downward.

\( g(x) = x^4 - 4x^3 + 2x + 1 \)

inf. pt.

conc. up

conc. down

5) From \([0,5]\) tell me about the function. (Use graph to the right)

**List the x - coordinates for each:**  
Inflection points __________
Relative maximum __________
Relative minimum __________
Hard points __________

**Find each:**  
Abs. max. value ________
Abs. min. value ________
Abs. max. value occurs at ________
Abs. min. value occurs at ________

**On which interval(s) is the graph:**  
increasing/concave up___________
increasing/concave down___________
decreasing/concave up___________
decreasing/concave down___________

6) If \( f(x) = x^3 - 61 \), and \( x_1 = 4 \). Use Newton's Method to find the third approximation \( x_3 \).
7) \( f''(x) = (x - 2)^2 (2x + 7) \) Find where inflection point(s) occur(s) and concavity.

<table>
<thead>
<tr>
<th>inf. pt.</th>
<th>conc. up</th>
<th>conc. down</th>
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<td>( x = )</td>
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8) \( f'(x) = x - \frac{5}{x} \) Find where the rel. extreme values occur and when the graph increases and decreases.

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<thead>
<tr>
<th>rel. max.</th>
<th>rel. min.</th>
<th>inc.</th>
<th>dec.</th>
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<td>( x = )</td>
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9) The average cost of our product is given by \( \bar{C} = 10x + \frac{400,000}{x} \).

a) How many of our product should we make to minimize the average cost? ____________

b) What is the average cost per unit? ____________

Tell me what symbols represent

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<td>( f'(x) &lt; 0 ) and ( f''(x) &gt; 0 )</td>
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<td>( f(x) = \frac{10}{x} ), find all numbers ( c ) in the interval ((1, 5)) where the Mean Value Theorem applies.</td>
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<td>dec. /conc. down</td>
<td>dec. /conc. up</td>
<td>inc. /conc. up</td>
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14) Draw each graph

15) Given \( f'(-2) = 0 \) and \( f'(5) = 0 \) and \( f''(x) = \frac{9x + 11}{(x + 3)^3} \). Use the 2nd derivative test to determine if the critical points are relative maximums, relative minimums, or neither.

\(-2\) is ________________  

\(5\) is ________________

16) Given \( f(x) = \frac{10}{x} \), find all numbers \( c \) in the interval \((1, 5)\) where the Mean Value Theorem applies.