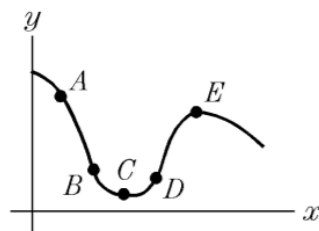


<p>1. Find the critical numbers of <math>f(x) = x^3 - 12x^2</math>.</p> <p><b>A</b> 0 and 8</p> <p><b>B</b> 3, 8</p> <p><b>C</b> -8, 0, 3</p> <p><b>D</b> 1 only</p>	<p>2. Given that <math>f(x) = -x^2 + 12x - 28</math> has a relative maximum at <math>x = 6</math>, choose the correct statement.</p> <p><b>A</b> <math>f'</math> is negative on the interval <math>(-\infty, 6)</math></p> <p><b>B</b> <math>f'</math> is positive on the interval <math>(-\infty, \infty)</math></p> <p><b>C</b> <math>f'</math> is negative on the interval <math>(6, \infty)</math></p> <p><b>D</b> <math>f'</math> is negative for all real values</p>
<p>3. For what <math>x</math> coordinate(s) does the function defined by <math>f(x) = 3x^5 - 5x^3 - 8</math> have a relative <i>minimum</i>?</p> <p><b>A</b> 0 and 1</p> <p><b>B</b> 0 and -1</p> <p><b>C</b> 1 only</p> <p><b>D</b> -1 only</p>	<p>4. Over which interval(s) is <math>f(x) = \frac{x^2}{x^2 + 4}</math> is increasing?</p> <p><b>A</b> <math>(0, \infty)</math></p> <p><b>B</b> <math>(-\infty, 0)</math></p> <p><b>C</b> <math>(-\infty, \infty)</math></p> <p><b>D</b> <math>(-\infty, 0)</math> and <math>(2, \infty)</math></p>
<p>5. Find all intervals on which the function <math>y = 8x^3 - 2x^4</math> is concave downward.</p> <p><b>A</b> <math>(-\infty, 0)</math> and <math>(2, \infty)</math></p> <p><b>B</b> <math>(-\infty, 2)</math> and <math>(8, \infty)</math></p> <p><b>C</b> <math>(0, 2)</math></p> <p><b>D</b> <math>(24, 48)</math></p>	<p>6. If <math>f(x) = x^3 - 3x^2 - x + 7</math>, determine its point of inflection.</p> <p><b>A</b> <math>(1, 4)</math></p> <p><b>B</b> <math>(2, 1)</math></p> <p><b>C</b> <math>(3, 4)</math></p> <p><b>D</b> <math>(-1, 4)</math></p>

7. Let  $f$  be defined by  $f(x) = x^2(x - 3)$  for all real numbers  $x$ . For what values of  $x$  is the function increasing?

- A  $0 < x < 2$
- B  $0 < x < 3$
- C  $0 < x < \infty$
- D  $-\infty < x < 0$  and  $x > 2$

8. At which of the five points shown on the graph are  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  both positive?



- A A
- B B
- C D
- D E

9. Let  $f''(x) = 3x^2 - 4$  and let  $f(x)$  have critical numbers  $-2$ ,  $0$ , and  $2$ . Use the Second Derivative Test to determine which critical numbers, if any, gives a relative maximum.

- A  $-2$
- B  $2$
- C  $0$
- D  $0, \pm 2$

10. Find all intervals on which the following is concave upward:  $f(x) = \frac{x + 2}{x - 5}$ .

- A  $(-\infty, \infty)$
- B  $(-\infty, 5)$
- C  $(5, \infty)$
- D  $(5, -2)$

11. Based on the graph of  $f(x)$ , shown to the right, which of the following is true?

- A.  $f'(3) = 0, f''(3) < 0$
- B.  $f'(3) = 0, f''(3) > 0$
- C.  $f''(3) = 0, f'(3) < 0$
- D.  $f''(3) = 0, f'(3) > 0$

