

Quiz on Chapter 4

1. The function $f(x) = x^3 - 7$ has a point of inflection with an x -coordinate of
A) 0 B) 3 C) 7 D) None exist E) -7

2. Find the relative extrema for $f(x) = x^4 - 12x^2 + 3$.

3. $f(x) = x^2 + 2x + 4$ has a

- A) relative minimum at $x = -2$
B) relative maximum at $x = -1$
C) relative minimum at $x = -1$

- D) relative maximum at $x = -4$
E) relative maximum at $x = -2$

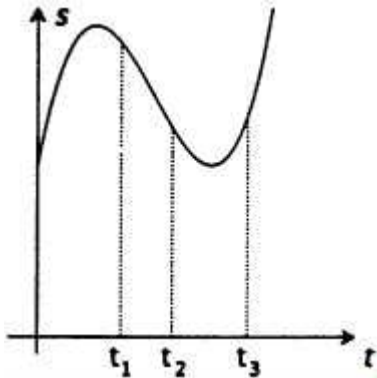
4. The open interval over which f is concave up for $f(x) = 6x^3 + 2x^2 - 4x + 4$ is

- A) $\left(-\infty, -\frac{1}{9}\right)$ B) $\left(\frac{1}{9}, \infty\right)$ C) $(-\infty, \infty)$ D) $\left(-\frac{1}{9}, \frac{1}{9}\right)$ E) $\left(-\frac{1}{9}, \infty\right)$

5. $f(x) = x^2 - 6x - 16$ has an absolute minimum on $[-5, 5]$ of

- A) -25 B) -31 C) 7 D) 11 E) 3

6. The graph below depicts the position function of a particle moving on a straight line at three different times. For each time specify whether it is speeding up or slowing down.



7. A sheet of cardboard 18 in square is used to make an open box by cutting squares of equal size from the corners and folding up the sides. What size squares should be cut to obtain a box with largest possible volume?

8. The interval over which f is increasing for $f(x) = (x - 7)^4$ is

- A) $(-\infty, 7)$ B) $(-7, \infty)$ C) $(-\infty, -7)$ D) $(-7, 7)$ E) (b, ∞)

9. Given $f(x) = x^3 - 4x + 3$ over the interval $[-2, 3]$. Find all values of C that satisfy the Mean-Value Theorem.

10. Find the value c such that the conclusion of Rolle's Theorem are satisfied for $f(x) = 4x^2 - 6$ on $[-2, 2]$.
A) 0.5 B) 1 C) 0 D) -0.5 E) -1

Answer Key

1. A

2. $f'(x) = 4x(x^2 - 6)$

Critical points at $x = -\sqrt{6}$, 0 , $\sqrt{6}$

$$f''(x) = 12x^2 - 24, f''(-\sqrt{6}) > 0; f''(0) < 0; f''(\sqrt{6}) > 0$$

Relative minimum of -33 at $x = \pm\sqrt{6}$; Relative maximum of 3 at $x = 0$

3. C

4. E

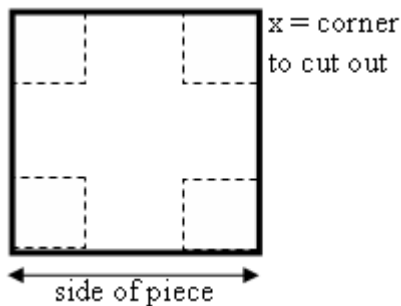
5. A

6. At t_1 : The particle is moving to the left (slope is negative) and is slowing down (Concave down and negative slope means the slope is more negative (further from 0))

At t_2 : The particle is moving to the left (slope is negative) and is slowing down (Concave down and negative slope means the slope is getting closer to 0).

At t_3 : The particle is moving to the positive (slope is positive) and is speeding up (concave up and positive slope means the slope is getting more positive (further from 0))

7. Volume is largest when $x = 3$ inches



8. E

9. $f(-2) = 3$

$$f(3) = 12$$

$$f'(x) = 3x^2 - 4$$

$$3C^2 - 4 = \frac{12 - 3}{3 - (-2)} = 1.8$$

$$C = \pm \sqrt{\frac{5.8}{3}} \approx \pm 1.3904$$

10. C