

# Multiple-Choice Test

## Chapter 09.02 Newton's Method

1. Which of the following is NOT required for using Newton's method for optimization?
  - (A) The lower bound for search region.
  - (B) Twice differentiable optimization function.
  - (C) The function to be optimized.
  - (D) A good initial estimate that is reasonably close to the optimal.
2. Which of the following statements is INCORRECT?
  - (A) If the second derivative at  $x_i$  is negative, then  $x_i$  is a maximum.
  - (B) If the first derivative at  $x_i$  is zero, then  $x_i$  is an optimum.
  - (C) If  $x_i$  is a minimum, then the second derivative at  $x_i$  is positive.
  - (D) The value of the function can be positive or negative as any optima.
3. For what value of  $x$ , is the function  $x^2 - 2x - 6$  minimized?
  - (A) 0
  - (B) 1
  - (C) 5
  - (D) 3
4. We need to enclose a field with a fence. We have 500 feet of fencing material with a building on one side of the field where we will not need any fencing. Determine the maximum area of the field that can be enclosed by the fence.
  - (A)  $x = 125, y = 250$
  - (B)  $x = 150, y = 200$
  - (C)  $x = 125, y = 100$
  - (D)  $x = 200, y = 150$
5. A rectangular box with a square base and no top has a volume of 500 cubic inches. Find the length,  $l$  of the edge of the square base and height,  $h$  for the box that requires the least amount of material to build. Conduct two iterations using an initial guess of  $l = 5 \text{ in}$

- (A) Base edge length is 10.00 and height is 5.00
  - (B) Base edge length is 9.17 and height is 6.00
  - (C) Base edge length is 9.00 and height is 6.17
  - (D) Base edge length is 10.00 and height is 10.00
6. A rectangular box with a square base with no top has a surface area of  $108 \text{ ft}^2$ . Find the dimensions that will maximize the volume. Conduct two iterations using an initial guess of  $l = 3 \text{ ft}$
- (A) Base edge length is 4.15 and height is 4.85
  - (B) Base edge length is 6.15 and height is 2.85
  - (C) Base edge length is 6.00 and height is 3.00
  - (D) Base edge length is 3.85 and height is 6.15