

Name: \_\_\_\_\_ Section: \_\_\_\_\_

**Instructions:** Show all your work in order to receive proper credit. No formula sheets and no notes are allowed during the quiz. No cell phones, calculators, or any other electronic devices are allowed in a student's possession during any quiz. All such devices must be put away in the student's bag, out of reach of the student during the quiz. Quiz should be completed in one seating with no breaks. Your work must be written clearly using proper notation. Answers must be justified using techniques that have been taught in this course. Good luck! **Timing:** 15 minutes

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1. **(4 pts)** The total surface area of a cube is changing at a rate of  $12 \text{ in}^2/\text{sec}$  when the length of one of the sides is  $10 \text{ in}$ . At what rate is the volume of the cube changing at that time? You must include correct units as part of your answer.

2. **(3 pts)** If  $x$  units of a certain product are produced, the total cost is  $C(x) = 3x + 9$  and the selling price per unit is  $p(x) = 40 - 0.5x$ . Determine the level of production that maximizes profit.
3. **(3 pts)** If  $x$  units of a certain product are produced, the total cost is  $C(x) = x^3 - 22x^2 + 30x$ . Find the level of production that minimizes the average cost. You must justify that your answer really does give the minimum average cost.