

Name V2  
ID \_\_\_\_\_

**Question 2** Suppose that market demand is given by  $p = 16 - \sqrt{q+3}$ . Answer the following question.

a. (3 points) For  $q \geq 0$ , is the demand function an increasing function?

$$\frac{dp}{dq} = -\frac{1}{2}(q+3)^{-\frac{1}{2}} < 0 \rightarrow \text{decreasing}$$

$$= -\frac{1}{2}\left(\frac{1}{\sqrt{q+3}}\right) \quad \sqrt{q+3} = 11$$

$$\therefore \frac{dp}{dq} = -\frac{1}{2} \cdot \frac{1}{11} = -\frac{1}{22}$$

b. (3 points) For  $q \geq 0$ , is the demand function a concave or convex function?

$$\frac{d^2p}{dq^2} = \frac{1}{4}(q+3)^{-\frac{3}{2}} > 0$$

c. (6 points) Calculate the elasticity of demand when  $p = 5$ .

$$p = 5 \rightarrow 5 = 16 - \sqrt{q+3} \Rightarrow \sqrt{q+3} = 11$$

$$q+3 = 121$$

$$q = 118$$

$$\epsilon_d = \left(\frac{1}{\frac{dp}{dq}}\right) \cdot \frac{p}{q} = \frac{1}{-\frac{1}{22}} \cdot \frac{5}{118}$$

$$\epsilon_d = -\frac{110}{118}$$

d. (3 points) Should the monopolist raise the price above \$5 if the monopolist wants to boost the total revenue?

$$|\epsilon_d| = \frac{110}{118} < 1 \quad \therefore \text{Inelastic demand}$$

increasing/raising price  $\Rightarrow$  helpful if firm wishes to increase total revenue. ✓