

Quiz 8

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §3.3 #45 (2 marks) Find the derivative of the function f .

$$f(x) = \sqrt{1-x^2} \arcsin x$$

$$f'(x) = \frac{1}{2\sqrt{1-x^2}} \cdot -2x \arcsin x + \sqrt{1-x^2} \cdot \frac{1}{\sqrt{1-x^2}} = 1 - \frac{x \arcsin x}{\sqrt{1-x^2}}$$

Question 2. §3.4 #13 The weekly demand for the Pulsar 25 color LED television is

$$p = 600 - 0.05x \quad (0 \leq x \leq 12000)$$

where p denotes the wholesale unit price in dollars and x denotes the quantity demanded. The weekly total cost function associated with manufacturing the Pulsar 25 is given by

$$C(x) = 0.000002x^3 - 0.03x^2 + 400x + 80000$$

where $C(x)$ denotes the total cost incurred in producing x sets.

- (2 marks) Find the revenue function R and the profit function P .
- (3 marks) Find the marginal cost function C' , the marginal revenue function R' and the marginal profit function P' .
- (1 mark) Compute $P'(2000)$ and interpret your results.

a) $R(x) = xp(x) = x(600 - 0.05x) = 600x - 0.05x^2$, $P(x) = R(x) - C(x)$ b) $C'(x) = 0.000006x^2 - 0.06x + 400$ $R'(x) = 600 - 0.1x$ $P'(x) = -0.000006x^2 - 0.04x + 200$	$= 600x - 0.05x^2 - [0.000002x^3 - 0.03x^2 + 400x + 80000]$ $= -0.000002x^3 - 0.02x^2 + 200x - 80000$
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$$P'(2000) = -0.000006(2000)^2 - 0.04(2000) + 200 = 96$$

\therefore The profit gained by selling the 2001st television is 96 \$

Question 3. §3.4 #23 (2 marks) Compute the elasticity of demand and determine whether the demand is elastic, unitary, or inelastic at the indicated price.

$$f(p) = x = -\frac{5}{4}p + 20 \quad p = 10$$

$$\text{so } f'(p) = -\frac{5}{4}$$

$$\therefore E(10) = \frac{10}{16-10} = \frac{10}{6} = \frac{5}{3}$$

$$E(p) = -\frac{pf'(p)}{f(p)} = \frac{-p(-\frac{5}{4})}{-\frac{5}{4}p + 20} = \frac{p}{16-p}$$

$\therefore E(10) > 1 \therefore$ elastic.