

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

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

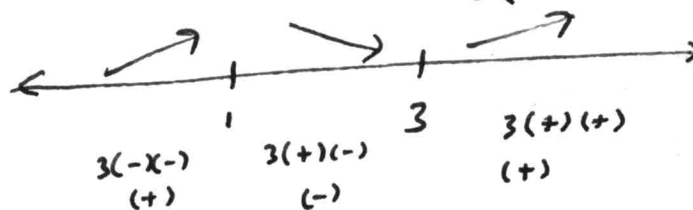
You have 10 minutes to complete the quiz. Please **show all work**, and **label your answer**.

1. Let  $f(x) = x^3 - 6x^2 + 9x$

Find the following. If a requested quantity doesn't exist, answer "DNE".

(a) (2 points) Identify the intervals where  $f(x)$  is increasing/decreasing.

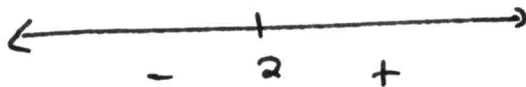
$$f'(x) = 3x^2 - 12x + 9 = 3(x^2 - 4x + 3) \\ = 3(x - 3)(x - 1)$$



1pt increasing on  $(-\infty, 1) \cup (3, \infty)$  decreasing on  $(1, 3)$  1pt

(b) (2 points) Identify the intervals where  $f(x)$  is concave up/down.

$$f''(x) = 6x - 12 = 6(x - 2)$$



1pt each concave up on  $(2, \infty)$   
concave down on  $(-\infty, 2)$

(c) (2 points) Find the  $x$  value(s) of the local maxima and local minima of  $f$ .

1pt each local max at 1  
local min at 3

(d) (2 points) Find the  $x$  value(s) of the inflection points of  $f$ .

inflection pt at 2.

CONTINUED ON BACK

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2. (2 points) Suppose that a product had price-demand function  $x = \frac{2}{p}$ . Find the price elasticity function. What is the elasticity of demand when  $p = \$1$ ? What about when  $p = \$100$ ?

$$\begin{aligned} E(p) &= \frac{-p}{x} \cdot \frac{dx}{dp} \quad \left[ \begin{array}{l} x = 2 \cdot p^{-1} \\ \frac{dx}{dp} = -2 \cdot p^{-2} = \frac{-2}{p^2} \end{array} \right] \\ &= \frac{-p}{\frac{2}{p}} \cdot \frac{-2}{p^2} \\ &= \frac{+2p}{2p} \end{aligned}$$

$$E(p) = 1 \text{ for all } p$$

always has elasticity 1.