

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. A marine scientist measured the speed c of sound at a depth of 500 meters and temperature 15 degrees Celsius as a function of the salinity S of the water. The following table records the speed of sound c measured in meters per second in terms of the salinity S measured in parts per thousand.

Salinity S	35.0	35.6	36.2	36.8	37.4
Sound speed c	1515.36	1516.08	1516.80	1517.62	1518.24

- (a) The scientist knows that c versus S follows a linear model. Therefore, looking at the table, he realizes that one of his measurements for the sound speed is in error. Which entry is it and how should it be corrected? Please, explain.

- (b) Find a linear model for c as a function of S .

- (c) Explain in practical terms the meaning of the slope of the model of Part (b). Please, read carefully the statement of the problem and be as precise as you can.

- (d) Calculate $c(39)$ and explain in practical terms what it means.

2. A manufacturer of tourist key chains in China has fixed costs of \$ 700 per month and the variable cost is \$25 per thousand key chains. Let N be the number, in thousands, of key chains produced in a month.
- (a) Find a formula for the manufacturer's total cost C as a function of N .
- (b) The highest price p in dollars per thousand chains at which N (in thousands) can be sold is given by $p = 35 - 0.01N$. Using this, find a formula for the total revenue as a function of N .
- (c) Find a formula for the profit P of this manufacturer as a function of N .
- (d) What are the break-even points for this manufacturer, assuming that it can produce at most 1000 thousand chains per month?
- (e) How many thousand key chains must it produce to maximize its profit?