Solution

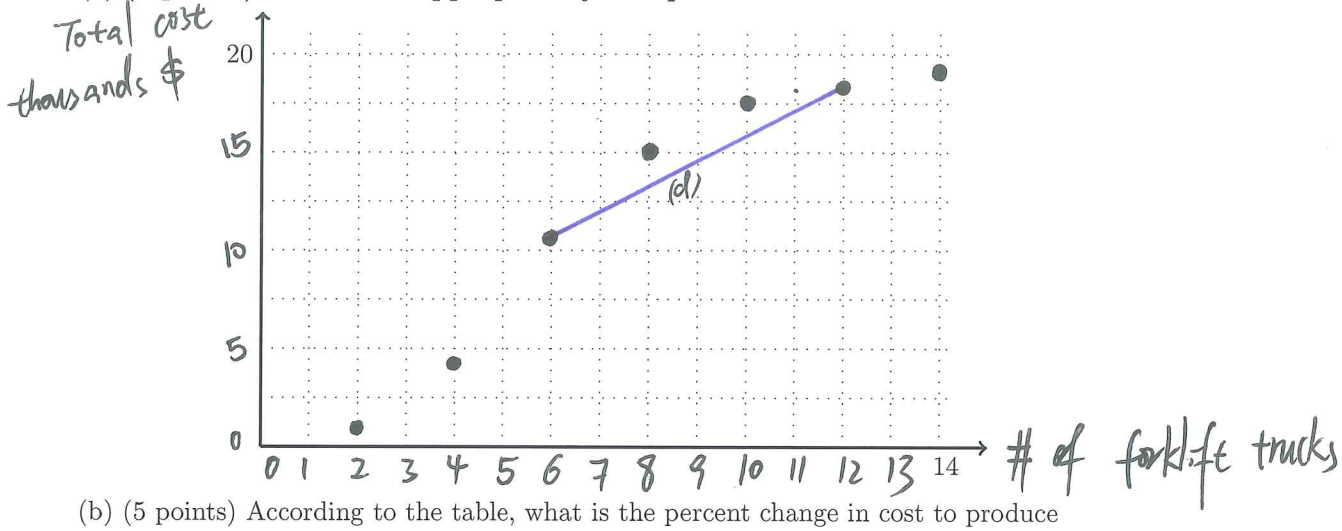
MATH 1231 Quiz 2 (50pts)
Fall 2014

Name: _____

1. The following table shows a manufacturers total cost (in thousands of dollars) to produce from 1 to 14 forklift trucks. Show work and give **units** for each answer. Round off answers to 3 decimal places.

# of forklift trucks produced	2	4	6	8	10	12	14
Total cost (thousands of dollars)	2.0	4.5	10.5	15.0	17.5	18.5	19.0

(a) **(5 points) Label axes appropriately and plot the data.**



(b) (5 points) According to the table, what is the percent change in cost to produce from 6 to 12 forklifts?

$$\text{percent change} = \frac{18.5-10.5}{10.5}\times 100\% = 76.190\%$$

(c) (5 points) According to the table, what is the average rate of change in cost to produce from 6 to 12 forklifts?

$$ARC = \frac{18.5-10.5}{12-6} = 1.333 \quad \text{thousands of \$ per forklift}$$

(d) (3 points) Draw and label a line segment through two of the points that you plotted in part (a) whose slope is given by the answer to part (c).

(e) (5 points) Let x stand for the number of forklifts produced and let $C(x)$ stand for the total cost to produce x forklifts. Fit a LOGISTIC MODEL to the data.

$$y = \frac{c}{1+a\cdot e^{-bx}} \qquad a = 32.668 \quad b = 0.606 \quad c = 18.971$$

unit: thousands of $

(h) (3 points) Estimate the cost to produce 9 forklifts using the model in part (e).

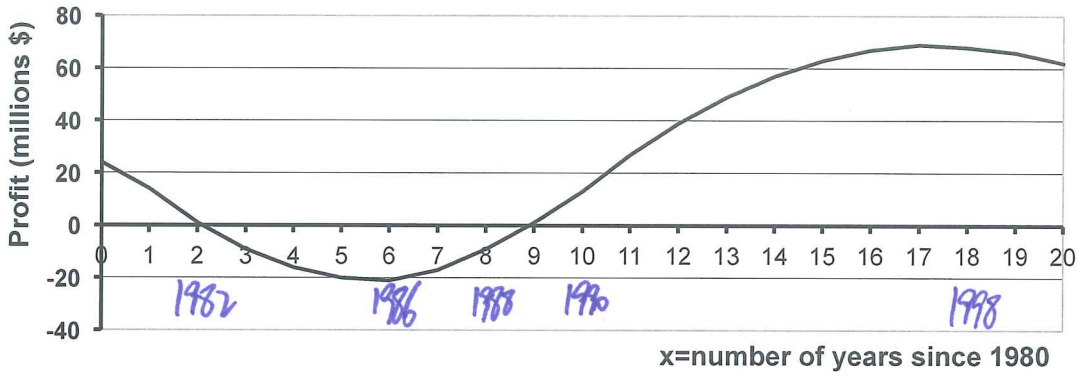
$$C(9) = Y1(9) = 16.644 \quad \text{thousands of \$}$$

(g) (4 points) Use the model in part (e) to approximate the average rate of change in cost to produce from 5 to 9 forklifts.

$$ARC = \frac{C(9)-C(5)}{9-5} = \frac{16.644-7.357}{4} = 2.322$$

thousands of $ per forklift

2. The following graph gives the profit of a company, in millions \$, in the years after 1980:



(a) (2points) The average rate of change in the profit from 1990 to 1998 was:

positive negative zero (circle one)

(b) (2points) In 1982, the instantaneous rate of change of the profit was:

positive negative zero (circle one)

(c) (2points) The percentage change in profit from 1986 to 1990 was:

positive negative zero (circle one)

(d) (2points) In 1988, the profit was:

positive negative zero (circle one)

(e) (3points) Estimate and list all the x values where the instantaneous rate of change of the profit was zero. Your answer should be a list of specific values not a range of values.

6 17

any number between 5 and 7. any number between 15 and 19

(f) (2points) Estimate the profit in 1981 (give **units**).

15 million \$ any number between 10 and 20

(g) (3points) Estimate the change in profit from 1981 to 1986 (give **units**).

$-20-15=-35$ million \$ Estimate

(h) (4points) Estimate the average rate of change of the profit from 1981 to 1986. Show work, and give your answer with **units**.

$$ARC = \frac{-20-15}{5} = -7 \quad \text{million \$ / year}$$