

#4 error

$$4x^3 - 8x^2 - 36x + 72 = 0$$

↑

MAC1105 Test 4

Name Key

Prof Howard (3-16)

4.5 points each

Show work for credit.

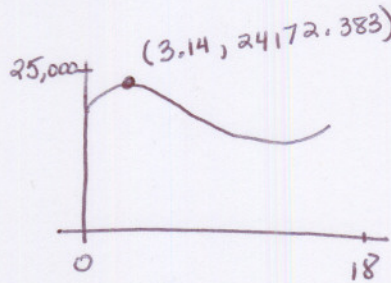
1. The total number of people killed in alcohol-related crashes can be modeled by the function

$$f(x) = -0.3718x^4 + 21.9933x^3 - 395.6523x^2 + 1880.2042x + 21524.7647$$

where x is the number of years from 1982.

- a.) State the degree of the polynomial. $n = 4$
- b.) State the leading coefficient. $-0.3718 = a$
- c.) How should the end behavior or tails look? $\downarrow \downarrow$
- d.) How many total solutions to $f(x) = 0$ are there? $4 = m$

e.) Sketch a graph of $f(x)$ from 1982 to 2000. Be sure to indicate your scale on the axes.

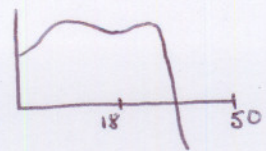


f.) In what year did the maximum number of fatalities occur? $x = 3 \Rightarrow 1985$

1982 + 3

g.) Is it likely that this model can be used to estimate the total number of fatalities for long after 2000? $x = 18 \Rightarrow 2000$

No, it decreases to zero shortly after



4.5 pts each

2.) A firm has total weekly revenue for its product given by $R(x) = 2000x + 30x^2 - 0.3x^3$, where x is the number of units sold.

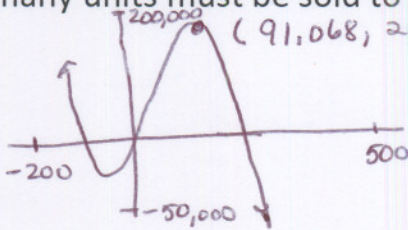
a.) Because x represents the number of units sold, what restrictions should be placed on x in the context of the problem? $x \geq 0$

b.) What restrictions should be placed on $R(x)$? $R \geq 0$

c.) If 60 units are sold, what revenue will be generated? $Y_1 = 2000x + 30x^2 - 0.3x^3$
CALC#1

$x = 60$ $Y = \$163,200$

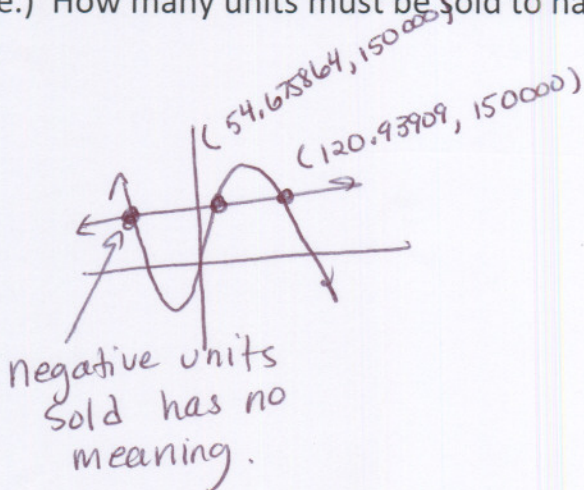
d.) How many units must be sold to have a maximum revenue?



$x = 91$ units sold

e.) How many units must be sold to have a revenue of \$150,000?

$Y_2 = \$150,000$



$x = 54.68$ and 120.92

OR

$x = 55$ and 121 units

4.5 points each

STAT EDIT WINDOW

STAT PLOT #1 GRAPH

3.) The table below gives the annual operating profit, in millions of dollars, of the Marriot Corporation for the years 1995-1999.

Years	1995 $x=0$	1996 $x=1$	1997 $x=2$	1998 $x=3$	1999 $x=4$
Profit	390	508	609	736	830

a.) Let x represent the number of years since 1995. Find the cubic function that is the best fit for the data. State the cubic function rounding each coefficient to two decimal places.

STAT CALC #6 ENTER

$$Y = -1.33x^3 + 6.43x^2 + 105.62x + 391.46$$

b.) What does this model estimate as the profit for 2000? $x=5$

Y1 = VARS #5 EQ #1 GRAPH

CALC #1 $x=5$ $y = 913.6 \Rightarrow (913.6)(1,000,000) =$

$$\boxed{\$ 913,600,000}$$

4.) Use factoring to solve $4x^3 - 8x^2 - 36x + 72 = 0$.

by grouping: $4x^2(x-2) - 36(x-2) = 0$

$$(4x^2 - 36)(x-2) = 0$$

$$4(x^2 - 9)(x-2) = 0$$

$$4(x+3)(x-3)(x-2) = 0$$

$4 \neq 0$ $x+3=0$ $x-3=0$ $x-2=0$

$$\boxed{x = -3}$$

$$\boxed{x = 3}$$

$$\boxed{x = 2}$$

5.) Use the root method to solve $2x^4 - 162 = 0$.

$$2x^4 = 162$$

$$\sqrt[4]{x^4} = \sqrt[4]{81}$$

$$\boxed{x = \pm 3}$$

4.5 pts each

6.) Given $f(x) = \frac{7}{x-4}$

$y = 7/(x-4)$

a.) State any vertical asymptotes.

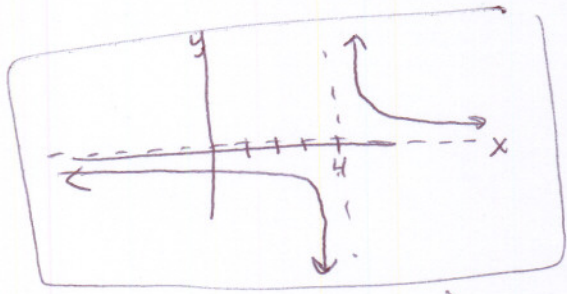
$x-4 \neq 0 \Rightarrow x \neq 4$

b.) State any horizontal asymptotes.

$m > n \Rightarrow y \neq 0$

c.) Sketch the graph using appropriate scale.

$7 \neq 0$
No x intercepts.



7.) Given $f(x) = \frac{x-1}{(x+3)(x-5)}$

$y = (x-1)/((x+3)(x-5))$

a.) State any vertical asymptotes.

$x+3 \neq 0 \Rightarrow x \neq -3$
 $x-5 \neq 0 \Rightarrow x \neq 5$

b.) State any horizontal asymptotes.

$m > n \Rightarrow y \neq 0$

c.) Sketch the graph using appropriate scale.

xint: $x-1=0$
 $x=1$

