MAT 137L Final Exam Review

- **Be able to identify type of function from a table:**

x	y
0	2400
1	3600
2	5400
3	8100
4	12150

y_2/y_1

$\frac{3600}{2400} = 1.5$

$\frac{5400}{3600} = 1.5$

$\frac{8100}{5400} = 1.5$

$\frac{12150}{8100} = 1.5$

Exponential

There is a constant ratio between y values of 1.5 (or a constant multiplier of 1.5)

x	y
0	0
1	3
2	8
3	15
4	24

$y_2 - y_1$ | 2nd Diff

$3-0=3$ | $5-3=2$

$8-3=5$ | $7-5=2$

$15-8=7$ | $9-7=2$

$24-15=9$

Quadratic

The 2nd difference between y values is constant.

x	y
0	−5
1	−2
2	7
3	22
4	43

$y_2 - y_1$ | 2nd Diff

$-2-(-5)=3$ | $9-3=6$

$7-(-2)=9$ | $15-9=6$

$22-7=15$ | $21-15=6$

$43-22=21$

Quadratic

The 2nd difference between y values is constant

x	y
0	3600
1	5400
2	7200
3	9000
4	10800

$y_2 - y_1$

$5400-3600=1800$

$7200-5400=1800$

$9000-7200=1800$

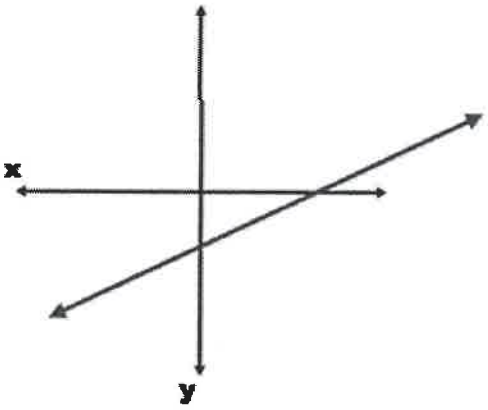
$10800-9000=1800$

Linear

The rate of change between y and x is constant

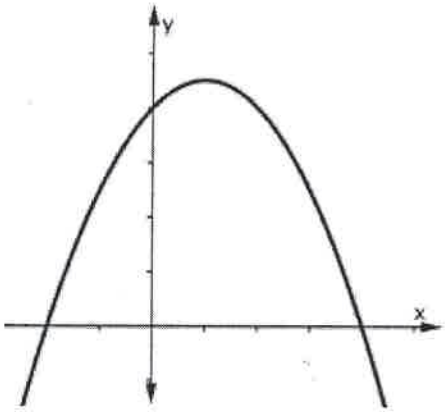
$\frac{y_2-y_1}{x_2-x_1} = 1800$

- **Be able to choose or write an equation of a function from a graph**



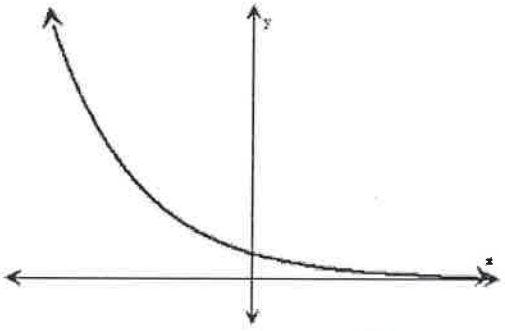
Linear $y=mx+b$
with $m>0$
$b<0$

Ex: $y=3x-2$



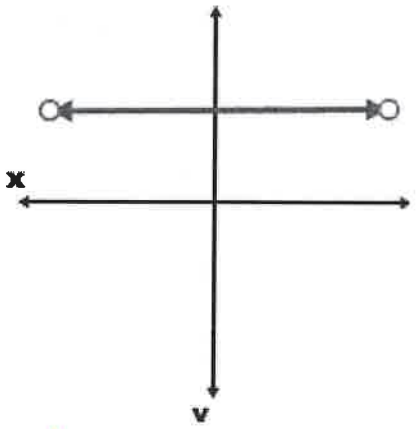
Quadratic: $y=ax^2+bx+c$
with $a<0$ (2x-int $b^2-4ac>0$)
$c>0$

Ex: $-2x^2+3x+5$



Exponential: $y=a(b)^x$
with $a>0$
$0<b<1$ (since decay)

Ex: $y=5(.8)^x$



Linear $y=mx+b$
with $m=0$
$b>0$

Ex: $y=5$

- **Be able to identify the type of equation from a situation and write the equation**
  - The number of bacteria cells in a petri dish was 800 and then increased at a rate of 1/9 every day.

    $y = 800(10/9)^x$ $\quad b = 1+r = 1+1/9 = 10/9$
  - A fish tank is full at a level of 4 feet deep and is going to be drained for cleaning until it's empty. The drain removes water that brings down the level 3 inches every hour.

    $y = -3x + 48$ or $y = -.25x + 4$
  - The value of a certain new car that costs $24,500 decreases in value by 7.8% each year after its purchase for the first 10 years.

    $y = 24{,}500(.922)^x$ $\quad b = 1-r$, $b = 1-.078 = .922$
  - A car rental company charges $25 to rent and 2 cents for every mile driven.

    $y = .02x + 25$

- **Write an equation given a description** (These will vary. Examples given)
  - An exponential decay function with an initial value of 340.

    $y = 340(.5)^x$ $\quad 0 < b < 1$
  - An exponential growth function with an initial value of 600.

    $y = 600(1.2)^x$ $\quad b > 1$
  - An increasing linear (growth) function with an initial value of 45.

    $y = 3x + 45$ $\quad m > 0$
  - A decreasing linear (decay) function with an initial value of ½.

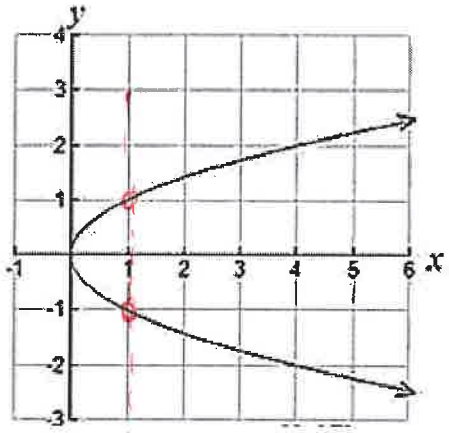
    $y = -2x + 1/2$ $\quad m < 0$
  - A quadratic function that opens up and an initial value of 10.

    $y = 2x^2 + 3x + 10$ $\quad a > 0$, $c = 10$
  - A quadratic function that has a maximum value and an initial value of 5.

    opens down $a < 0$

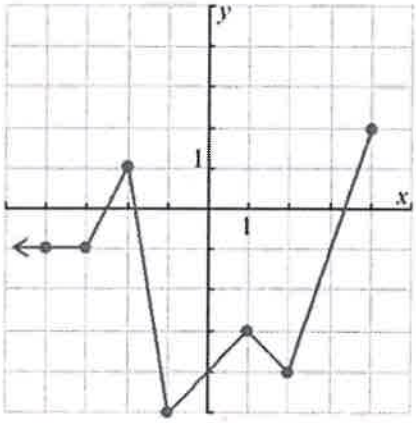
    $y = -2x^2 + 3x + 5$ $\quad c = 5$

- **Given a graph, use the definition of a function to determine if it is the graph of a function**



Not a function
There are inputs with more than one output

e.g. (1, 1) and (1, -1) both on graph



This is a function
Every input has exactly one output

- **Try these problems from the self-assessments in the workbook. Answers are given in the workbook:**
  - **New : Pages 39-40 (2,3)** **Old: Pages 38-39 (2,3)**
  - **New Page 83 #1 and Page 85 #4** **Old: Page 79 #1 and page 81 #4**
  - **New: Page 111 #2 and Page 113 #6** **Old: Page 103 #2, page 105 #6**
  - **New: Page136 #1 and Page 138 #3** **Old: Page 127 #1, page 128 #2**