

MATH 1101 FALL 2002
TEST 2 Key

1. In the table below values of a function $f(x)$ are given. Determine whether $f(x)$ is a linear function of x , a quadratic function of x , or neither. You **do not** need to find the function.

x	4	8	12	16
f(x)	41	89	169	281

The data is Quadratic

2. On January 1st the population, P , of ants in the room of an unnamed dorm is given as a function of time t , by the equation:

{ EMBED Equation.3 }

(Here t is measured in days)

- (a) What is the initial population of ants?

$$P(0) = 12$$

- (b) How many ants will there be after 10 days?

$$P(10) = 562$$

- (c) How many days will it take for the ant population to reach its maximum sustainable level which is 1812 ?

$$t = \underline{60} \text{ days later}$$

(Solve $P(t)=1812$ for t)

3. John throws a ball upward with an initial velocity of 48 ft/sec from the top of a building 240 feet high. The ball falls to the ground at the base of the building.

- (a) Give the quadratic function of the form $y(t) = -16t^2 + v_0t + y_0$ which specifically models this situation.

$$y(t) = -16t^2 + 48t + 240$$

- (b) When does the ball pass the top of the building on its way back down?

$$\dots t = 3$$

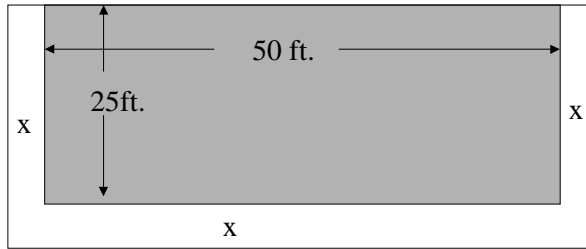
(solve $y(t) = 240$ for t)

- (c) How long is the ball in the air before it hits the ground?

$$\dots t = 5.65$$

(solve $y(t)=0$ for t)

4. You decide to build a walkway on three sides of your patio.



(a) Give the area of the walkway as a function of x .

$$A(x) = (50+2x)(25+x) - (50)(25)$$

(b) If the total area of the walkway is 400 square feet what is the width of the walkway?

$$x = 3.723$$

(solve $A(x) = 400$ for x)

5. Given the following population data where $t=0$ in 1950:

Year	0	10	20	30	40
Population	125	158	263	460	720

(a) Find the best-fit linear model.

$$P(t) = 14.92t + 46.8$$

(b) Find the best-fit quadratic model.

$$P(t) = 0.39t^2 - 0.68t + 124.8$$

(c) For the quadratic model find the predicted population for the year 2000.

$$P(50) = 1065.8$$

(d) For the quadratic model find SSE and the average error.

$$SSE = 42.4$$

$$Ave. Error = 2.912$$