

Logistic Function Worksheet

GRAPHING FUNCTIONS: Graph the function. Identify the asymptotes, y-intercept, and point of maximum growth.

1. $\frac{4}{1+3e^{-3x}}$

Asymptote: $y=0$ $y=4$

y-intercept: $(0,1)$

Point of maximum growth: 4

2. $\frac{8}{1+e^{-1.02x}}$

Asymptote: $y=0$ $y=8$

y-intercept: $(0,4)$

Point of maximum growth: 8

3. $\frac{6}{1+0.8e^{-2x}}$

Asymptote: $y=6$ $y=0$

y-intercept: $(0, 10/3)$

Point of maximum growth: 6

SOLVING EQUATIONS: Solve the equation.

4. $\frac{10}{1+2e^{-4x}} = 9$

$x = .7226$

5. $\frac{3}{1+18e^{-x}} = 1$

$x = 2.197$

6. $\frac{36}{1+7e^{-10x}} = 30$

$x = .3555$

The number of households in the United States that own VCRs has shown logistic growth from 1980 through 1999. The number H (in millions) of households can be modeled by the equation

$$H = \frac{91.86}{1 + 22.96e^{-0.4t}}$$

where t is the number of years since 1980. Source: Veronis, Suhler & Associates

7. In what year were there approximately 86 million households with VCRs?

$x = 15$ 1995

8. In what year did the growth rate for the number of households stop increasing and start decreasing?

~~X~~

9. What was the limit of VCR owners?

91.86 million

YEAST POPULATION: In biology class, you observed the biomass of a yeast population over a period of time. The table gives the yeast mass y (in grams) after t hours.

| t | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|-----|------|------|------|------|-------|-------|-------|-------|-------|
| y | 9.6 | 18.3 | 29.0 | 47.2 | 71.1 | 119.1 | 174.6 | 257.3 | 350.7 | 441.0 |

10. Draw a scatter plot of the data.

11. Find a model that gives y as a function of t using the logistic regression feature of a graphing calculator

y

$$\frac{721.43}{1 + 71.63e^{-.526x}}$$