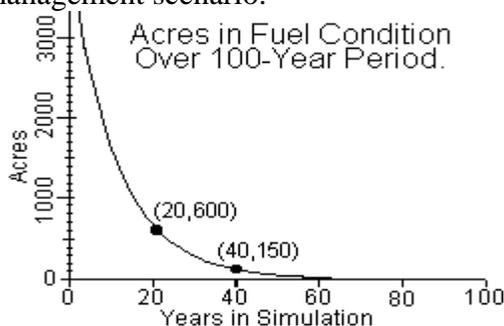


Directions: Show your work for credit. Write all responses on separate paper. No calculators.

1. Consider $f(x) = \left(x - \frac{4}{5}\right)^2 + \frac{9}{25}$

- a. Simplify $f(0)$ b. Simplify $f\left(\frac{4}{5}\right)$ c. Simplify $f\left(\frac{8}{5}\right)$ d. What is the range of f ?

2. The graph below models A , the number of acres of forest “in fuel condition” over a 100-year period, under one forest management scenario.



Which one of the following function formulas best describes A as a function of t ?

- a. $A(t) = 4000 - 170t$ b. $A(t) = \frac{12000}{t}$ c. $A(t) = \frac{240000}{t^2}$ d. $A(t) = (t - 60)^2$

3. The table below shows the intensity of sound I from a foghorn as inversely proportional to the square of the distance d^2 from the foghorn.

d	0.5	1	2
I	100528	25132	6283

- a. Compute the products of the square of the distance d^2 and the sound intensity I .
What is the constant of proportionality?
- b. Express the intensity of sound I as a function of its distance d from the foghorn.
4. The power P produced by a coal burning power plant (measured in Megawatts) is a function of the amount of anthracite A burned (measured in thousands of tons.)
If P is directly proportional to A and $P(500) = 200$, find a formula for $P(A)$.
5. Make a table of at least 7 (x, y) pairs for $f(x) = \frac{12}{(x-2)^2 + 1}$ and construct careful graph for f .
6. Make a table of at least 7 (x, y) pairs for $f(x) = 1 - \sqrt[3]{x-1}$ and construct careful graph for f .
7. Make a table of at least 7 (x, y) pairs for $f(x) = 3 - |x-3|$ and construct careful graph for f .
8. Consider the function $f(x) = \frac{1}{\sqrt{(x-1)(x-3)}}$.
- a. Are there any input values that lead to division by zero? If so, what are they?
- b. Are there any input values that lead to the square root of a negative number?
- c. What is the domain of the function?

Math 40 - Solutions For Chapter 5 Test – Spring '10

1. (a) $f(0) = \left(0 - \frac{4}{5}\right)^2 + \frac{9}{25} = \frac{16}{25} + \frac{9}{25} = 1$

(b) $f\left(\frac{4}{5}\right) = \left(\frac{4}{5} - \frac{4}{5}\right)^2 + \frac{9}{25} = \frac{9}{25}$

(c) $f\left(\frac{8}{5}\right) = \left(\frac{8}{5} - \frac{4}{5}\right)^2 + \frac{9}{25} = \frac{16}{25} + \frac{9}{25} = 1$

(d) Vertex at $(4/5, 9/25)$ so the range is $\left[\frac{9}{25}, \infty\right)$

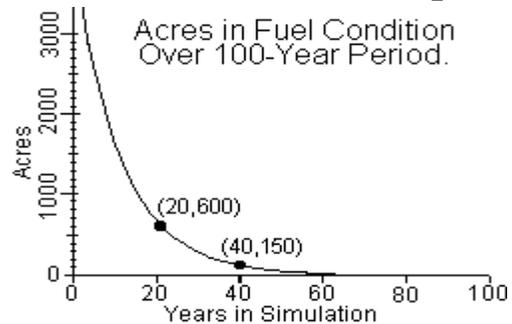
2. The graph below models A , the number of acres of forest “in fuel condition” over a 100-year period, under one forest management scenario.

SOLN: The coordinate pairs $(20,600)$ and

$(40,150)$ fit the function $A(t) = \frac{240000}{t^2}$, not the

others. $A(20) = \frac{240000}{400} = 600$ and

$$A(40) = \frac{240000}{1600} = 150$$



3. The table shows the intensity of sound I from a foghorn as inversely proportional to the square of the distance d^2 from the foghorn.

d	0.5	1	2
I	100528	25132	6283

- a. Compute the products of the square of the distance d^2 and the sound intensity I . What is the constant of proportionality?

SOLN: $d^2I = (0.5)^2 100528 = 100528/4 = 25132$

$$d^2I = (1)^2 25132 = 25132$$

$$d^2I = (2)^2 6283 = 25132$$

The constant of proportionality is 25132

- b. Express the intensity of sound I as a function of its distance d from the foghorn.

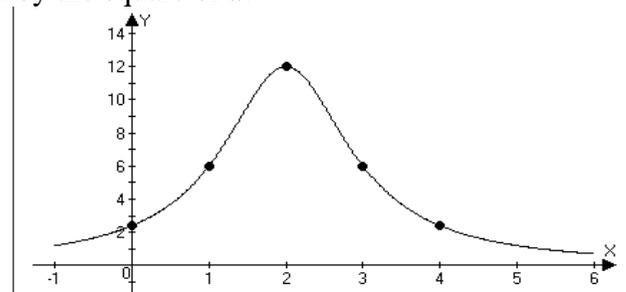
SOLN: $I = f(d) = 25132/d^2$. That's 25132 divided by the square of d .

4. $P(A) = \frac{2A}{5}$

5. $f(x) = \frac{12}{(x-2)^2 + 1}$ Here's a table of values:

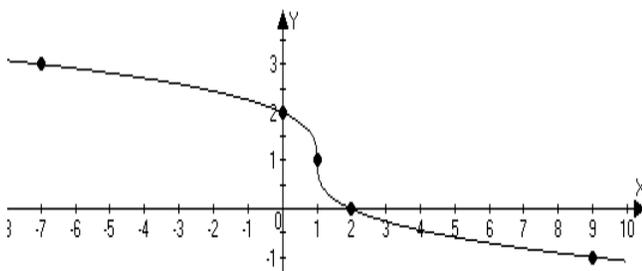
x	0	1	2	3	4
$f(x)$	2.4	6	12	6	2.4

and a graph:



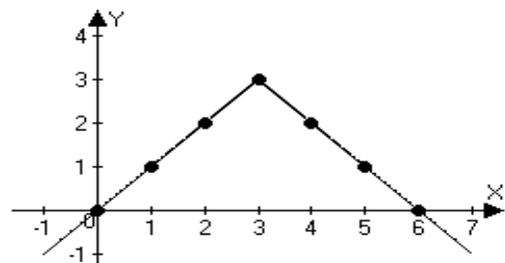
6. a. $f(x) = 1 - \sqrt[3]{x-1}$ Table:

x	-7	0	1	2	9
$f(x)$	3	2	1	0	-1



7. $f(x) = 3 - |x-3|$ so

x	0	2	3	4	6
$f(x)$	0	2	3	3	0



8. (a) Yes, $x = 1$ and $x = 3$ lead to division by zero.

(b) If $1 < x < 3$ then we have the square root of a negative number.

(c) The domain of the function is $\{x \mid x < 1 \text{ or } x > 3\}$.