

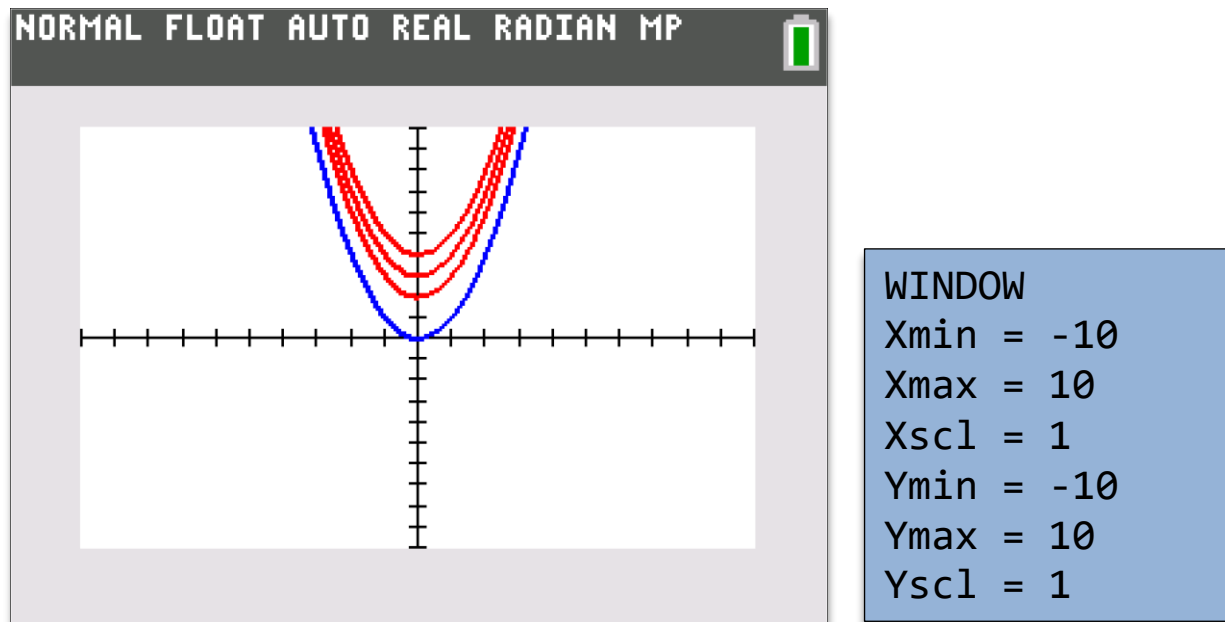
Teaching transformations of functions with T-84 Plus CE graphing calculator

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Problem 01

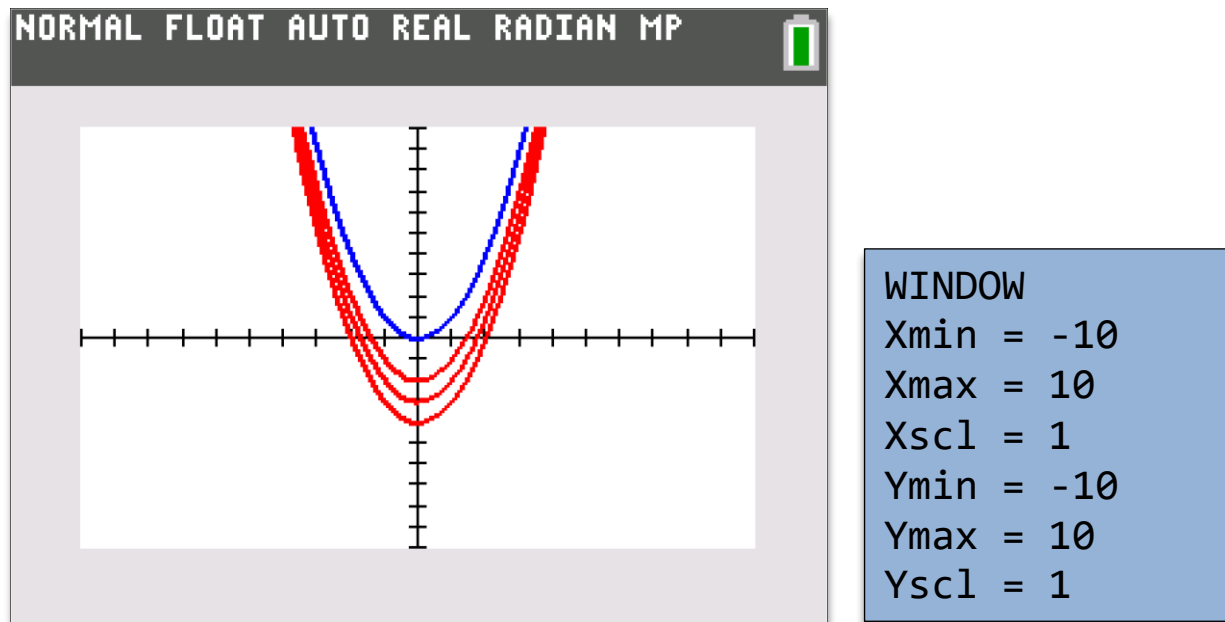


$$y_1(x) = x^2$$

$$y_2(x) = y_1(x) + L_1, \text{ where } L_1 = \{2, 3, 4\}$$

How would you describe the transformation?

Problem 02

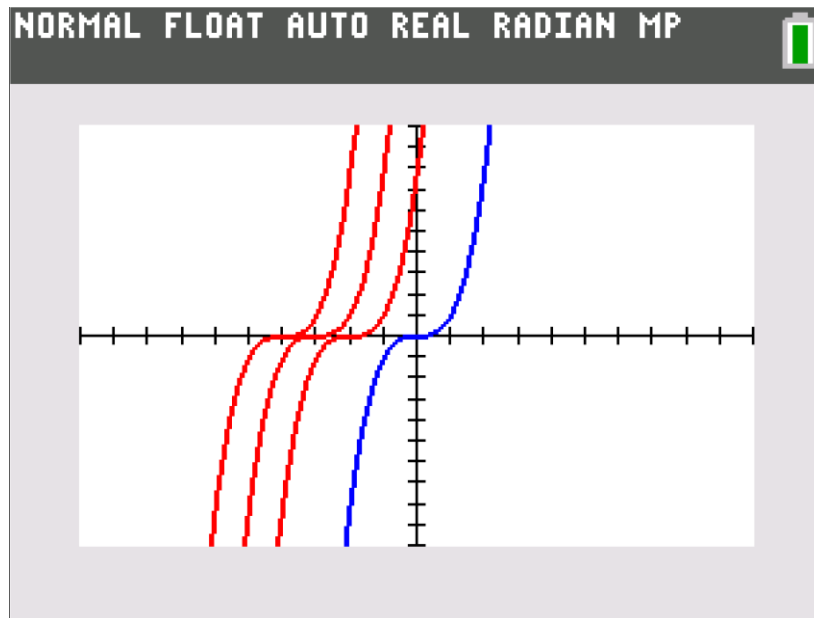


$$y_1(x) = x^2$$

$$y_2(x) = y_1(x) - L_1, \text{ where } L_1 = \{2, 3, 4\}$$

How would you describe the transformation?

Problem 03



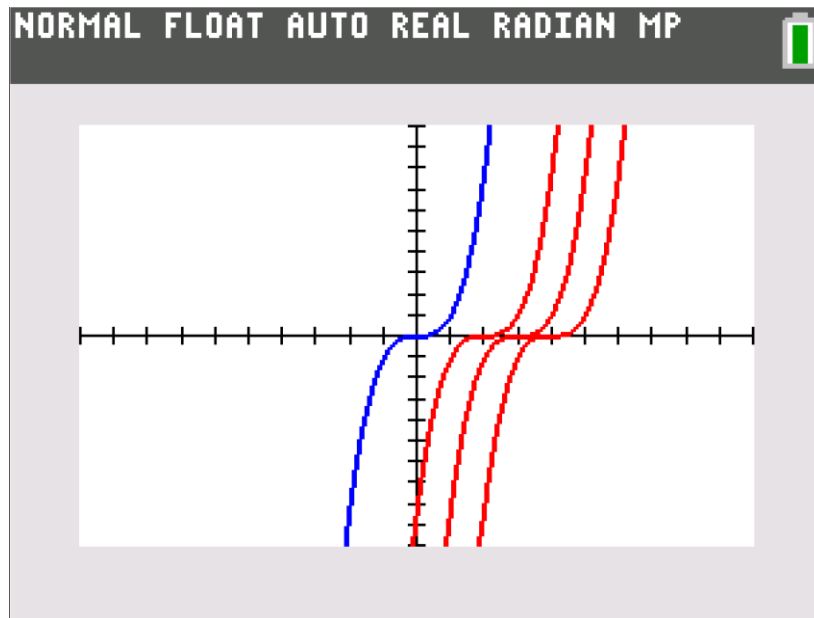
```
WINDOW
Xmin = -10
Xmax = 10
Xscl = 1
Ymin = -10
Ymax = 10
Yscl = 1
```

$$y_1(x) = x^3$$

$$y_2(x) = y_1(x + L_1), \text{ where } L_1 = \{2, 3, 4\}$$

How would you describe the transformation?

Problem 04



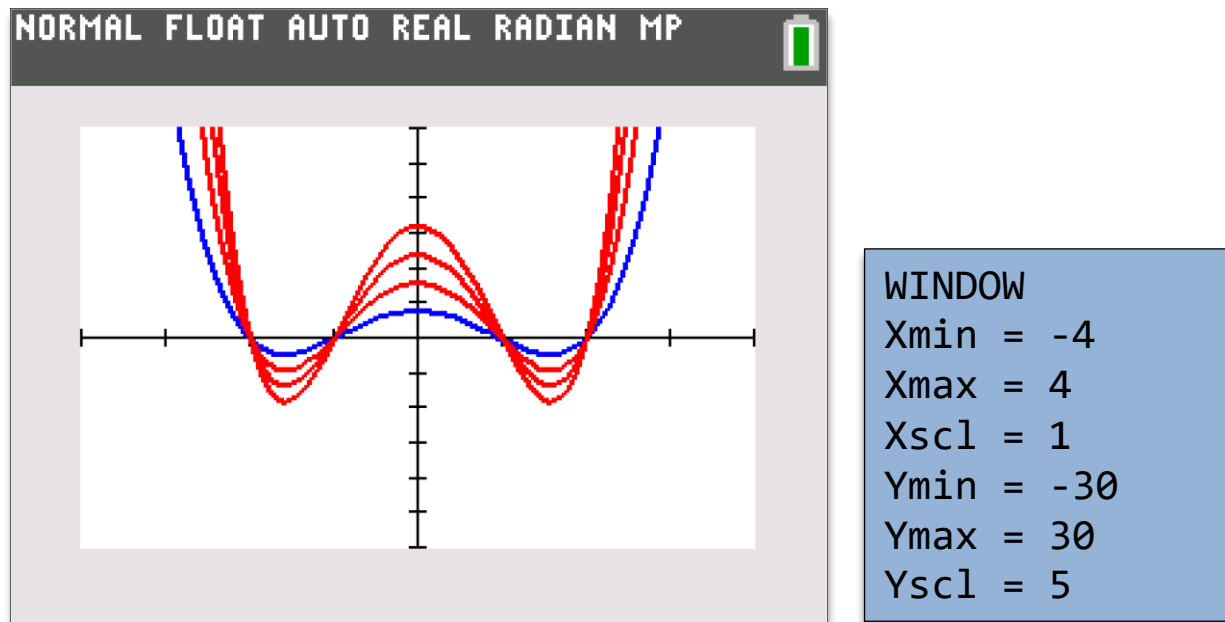
WINDOW
Xmin = -10
Xmax = 10
Xscl = 1
Ymin = -10
Ymax = 10
Yscl = 1

$$y_1(x) = x^3$$

$$y_2(x) = y_1(x - L_1), \text{ where } L_1 = \{2, 3, 4\}$$

How would you describe the transformation?

Problem 05



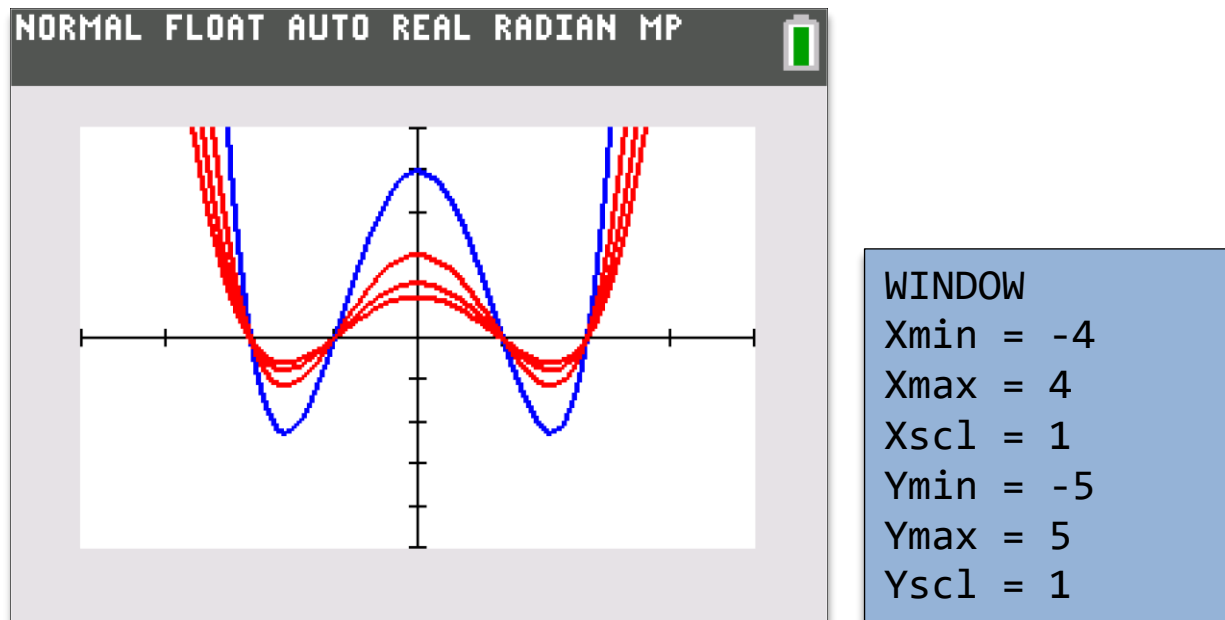
$$y_1(x) = (x^2 - 4)(x^2 - 1) = x^4 - 5x^2 + 4$$

$$y_2(x) = L_1 y_1(x), \text{ where } L_1 = \{2, 3, 4\}$$

How would you describe the transformation?

What happens to the x -intercepts of $y_1(x)$?

Problem 06



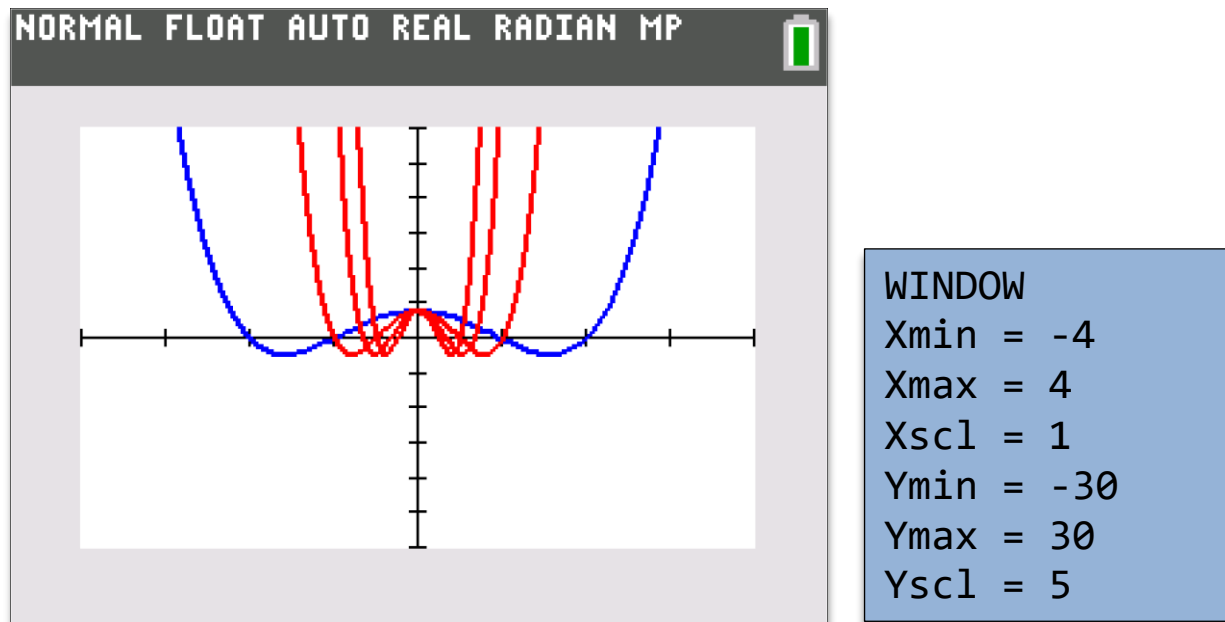
$$y_1(x) = (x^2 - 4)(x^2 - 1) = x^4 - 5x^2 + 4$$

$$y_2(x) = L_2 y_1(x), \text{ where } L_2 = \left\{ \frac{1}{2}, \frac{1}{3}, \frac{1}{4} \right\}$$

How would you describe the transformation?

What happens to the x -intercepts of $y_1(x)$?

Problem 07



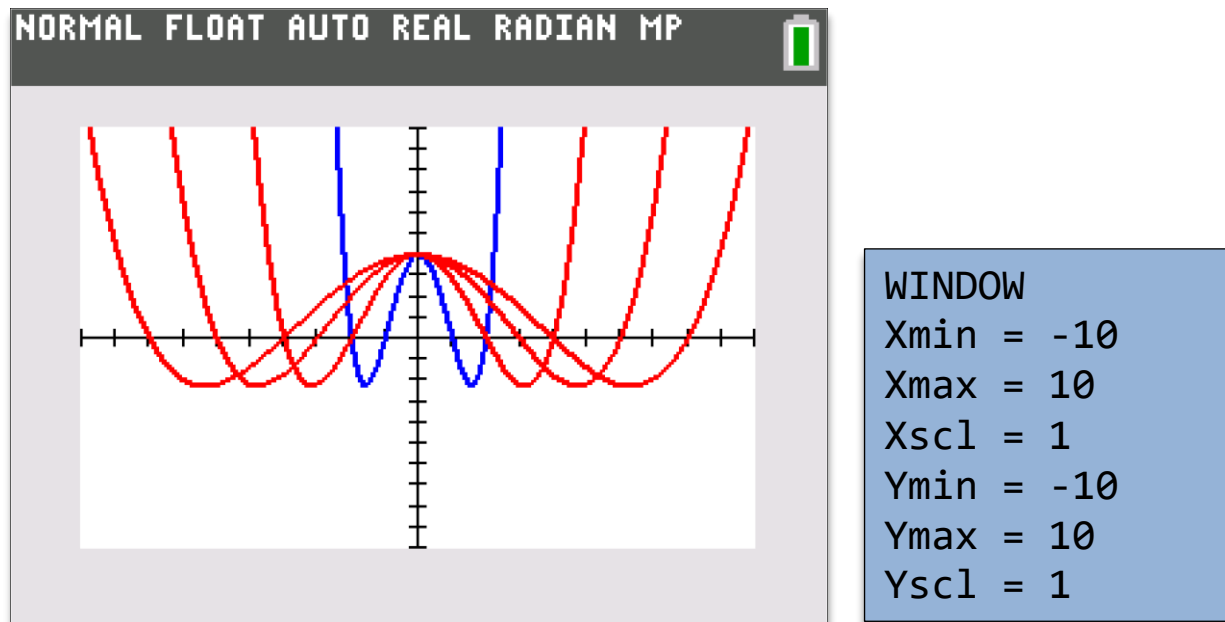
$$y_1(x) = (x^2 - 4)(x^2 - 1) = x^4 - 5x^2 + 4$$

$$y_2(x) = y_1(L_1 x), \text{ where } L_1 = \{2, 3, 4\}$$

How would you describe the transformation?

What happens to the y-intercept of $y_1(x)$?

Problem 08



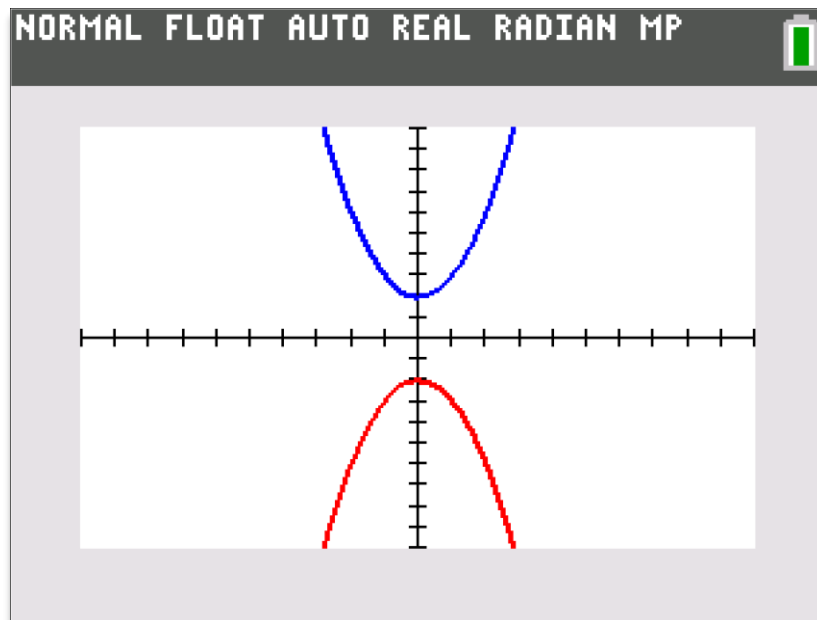
$$y_1(x) = (x^2 - 4)(x^2 - 1) = x^4 - 5x^2 + 4$$

$$y_2(x) = y_1(L_2x), \text{ where } L_2 = \left\{\frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right\}$$

How would you describe the transformation?

What happens to the y intercept of $y_1(x)$?

Problem 09

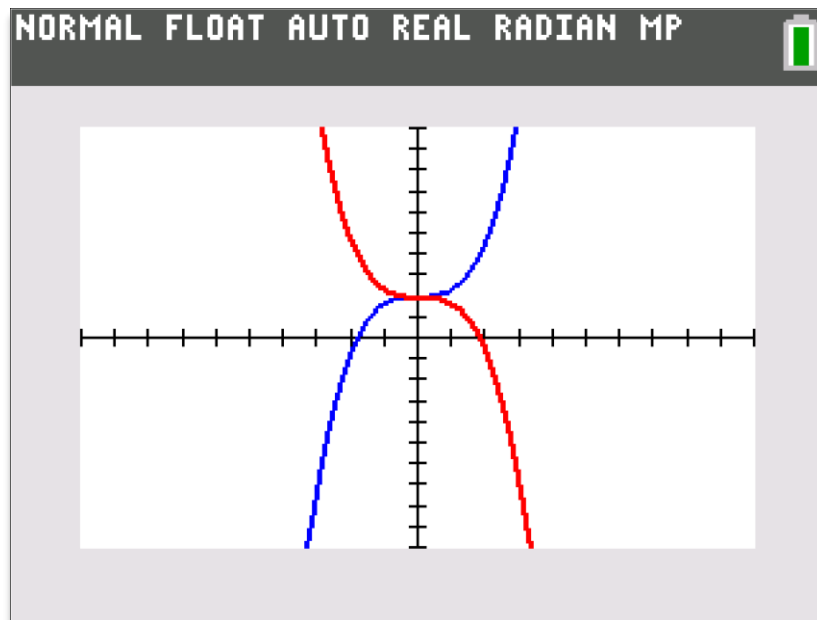


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WINDOW
Xmin = -10
Xmax = 10
Xscl = 1
Ymin = -10
Ymax = 10
Yscl = 1
```

$$y_1(x) = x^2 + 2$$
$$y_2(x) = -y_1(x)$$

How would you describe the transformation?

Problem 10



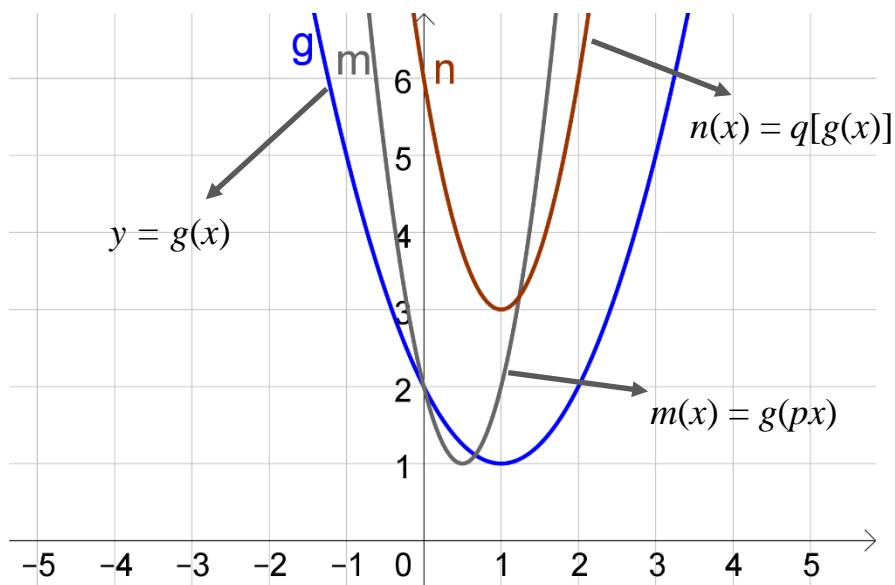
```
WINDOW
Xmin = -10
Xmax = 10
Xscl = 1
Ymin = -10
Ymax = 10
Yscl = 1
```

$$y_1(x) = 2 + \frac{x^3}{3}$$
$$y_2(x) = y_1(-x)$$

How would you describe the transformation?

Problem 11

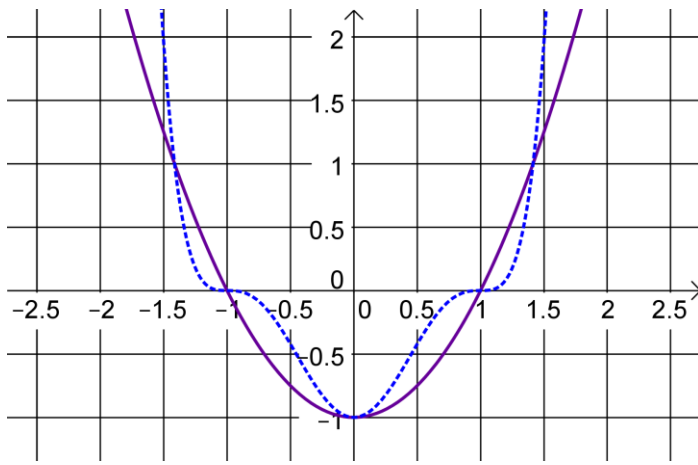
Let $y = g(x)$ be a function of x . Suppose for some positive integers p and q , $m(x) = g(px)$, and $n(x) = q[g(x)]$. The graphs of $g(x)$, $m(x)$ and $n(x)$ are shown below. Use the graph to estimate the values of p and q .



Write your answers below.

Problem 12

In the figure the solid curve represents $y_1 = x^2 - 1$ and the dotted curve represents $y_2 = (y_1)^n$. If n is an integer, what is the best value of n ?



a. $n = 0$

b. $n = 1$

c. $n = 2$

d. $n = 3$

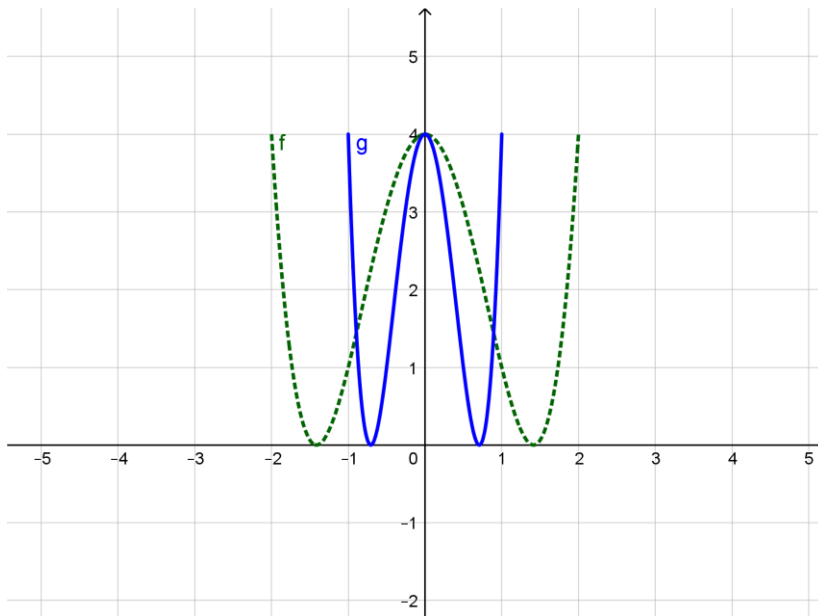
e. $n = 4$

e. $n = 6$

Write your answer below.

Problem 13

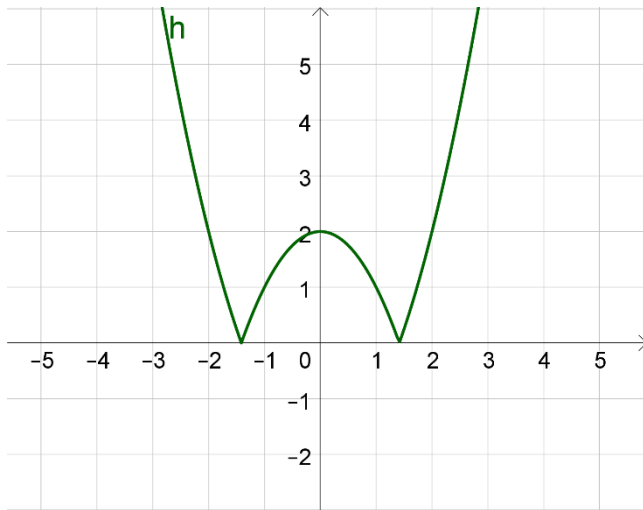
The function $y = f(x)$ is graphed using a dotted line. The function $g(x) = f(ax)$, for some real number a , is graphed using a solid line. Approximate the value of a .



Write your answer below.

Problem 14

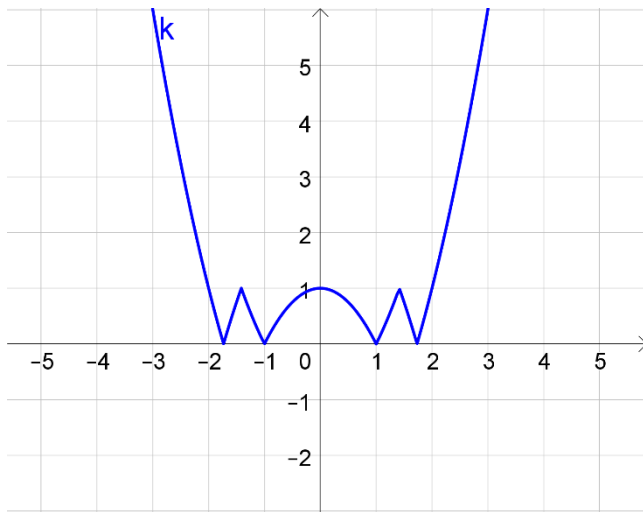
Suppose $f(x) = x^2$, $g(x) = f(x) - a$, for some positive integer a , $h(x) = |g(x)|$. The figure below shows a graph of $h(x)$, find the value of a .



Write your answer below.

Problem 15

Suppose $f(x) = x^2$, $g(x) = f(x) - 2$, $h(x) = |g(x)|$, $j(x) = h(x) - b$, for some positive integer b , and $k(x) = |j(x)|$. The figure below shows a graph of $k(x)$, find the value b .



Write your answer below.

Answers:

Problem 01: vertical translation moving up

Problem 02: vertical translation moving down

Problem 03: horizontal translation to the left

Problem 04: horizontal translation to the right

Problem 05: vertical stretch, nothing

Problem 06: vertical compression, nothing

Problem 07: horizontal compression, nothing

Problem 08: horizontal stretch, nothing

Problem 09: vertical reflection

Problem 10: horizontal reflection

Problem 11: $p = 2, q = 3$

Problem 12: d

Problem 13: $a = 2$

Problem 14: $a = 2$

Problem 15: $b = 1$