



\_\_\_\_\_ 1. (5pts) Express  $8.\overline{693}$  as a quotient of integers in simplest form.

\_\_\_\_\_ 2. (5pts) Find the difference quotient (average rate of change) from  $x$  to  $x + h$  of  $f(x) = 4 - 6x - x^2$ , and fully simplify.

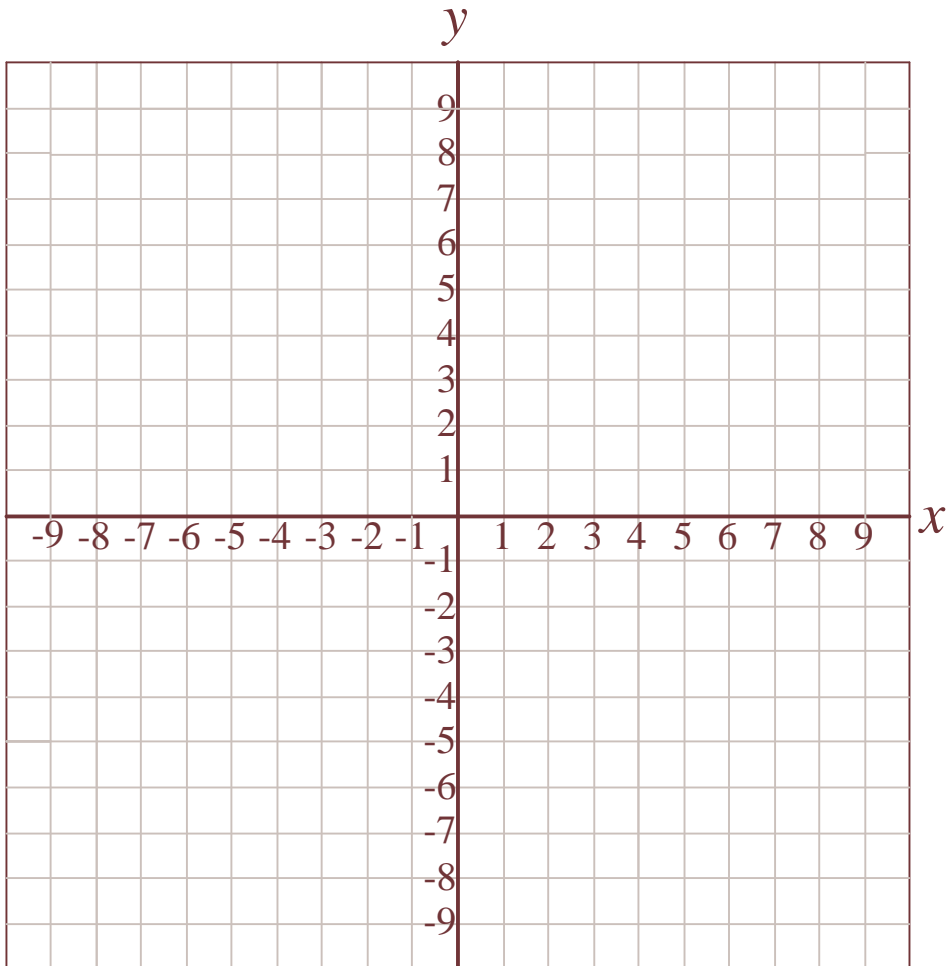
$x =$  \_\_\_\_\_ 3. (5pts) Exactly, algebraically solve  
 $x^{\frac{10}{3}} - 31x^{\frac{5}{3}} - 32 = 0$ .

4. (3pts) Sketch a graph of the piecewise-defined function,

$$f(x) = \begin{cases} x, & \text{if } x \leq -1 \\ \sqrt{x+3}, & \text{if } x > -1 \end{cases}$$

\_\_\_\_\_ (1pt) What is its domain in interval notation?

\_\_\_\_\_ (1pt) What is its range in interval notation?



5. Given the parabola  $y = x^2 - 40x - 500$ .

\_\_\_\_\_ (4ts) Algebraically find the vertex.

$y =$  \_\_\_\_\_ (1pt) Find the y-intercept.

\_\_\_\_\_ 6. (5pts) Fully simplify the given expression and eliminate any negative exponents. Where needed, use rational exponents instead of radical signs. Assume the variables denote any real numbers.

$$\left( \frac{16a^2c^{-4}d^3}{c^{12}d^{-9}} \right)^{\frac{1}{4}} =$$

7. (5pts) Find the inverse function of  $g(x) = \sqrt[3]{9 - 2x}$ .

$g^{-1}(x) =$  \_\_\_\_\_

\_\_\_\_\_ 8. (5pts) Solve the inequality  $\frac{5}{x-3} \leq \frac{8}{x+3}$   
and express the answer in interval notation.

$f(x) =$  \_\_\_\_\_ 9. (5pts) Fully simplify

$$f(x) = \frac{4(x+5)^3 - 4x(3)(x+5)^2}{((x+5)^3)^2} .$$

\_\_\_\_\_ 10. (5pts) What is the domain, in interval  
notation, of the function  $f(x) = \frac{x^{\frac{1}{3}}}{\sqrt{2x-16}}$  ?