Solving Non-Linear Systems Class Work

Solutions to nonlinear systems.

When systems are non-linear (involving quadratics, cubic functions, etc.), the simplest method of solving is often by using a table of input-out values and/or visualizing solutions via graphing!

Determine how many solutions the system of equations will have.
 (Hint: Use your previous knowledge of functions to possibly sketch a graph.)

$$y = x^2 + 3$$

 $y = -2$

2. Given the functions m(x) = |x - 3| + 2 and $n(x) = x^2 + 3$, determine the integer value(s) of x for which m(x) = n(x).

Using a table of values:

Graphing (you may use your calculator)

3. Determine the integer solution to $\frac{1}{2}|x+2| - 4 = x^2 - 19$. You may use your calculator to graph, but also support your answer with a table of input and output values. 4. Given the functions $k(x) = \frac{1}{2}|3x - 5|$ and $j(x) = -x^2 + 5$, which intervals contain a value of x for which j(x) = k(x)?

$$\Box$$
 -2 \leq x \leq -1 \Box -1.5 \leq x \leq -0.5 \Box -1 \leq x \leq 1 \Box 0.5 \leq x \leq 1.5 \Box 1.5 \leq x \leq 2.5 \Box 3 \leq x \leq 4

5. Given the functions p(x) = -|4x - 3| and $q(x) = 3x^2 - 12$, which intervals contain a value of x for which p(x) = q(x)?

 \Box -9 ≤ x ≤ -7
 \Box -4 ≤ x ≤ -3
 \Box -1.5 ≤ x ≤ -0.5

 \Box 0.5 ≤ x ≤ 1
 \Box 1 ≤ x ≤ 1.3
 \Box 1.3 ≤ x ≤ 2

6. Functions g and h are defined below. The graphs of y = g(x) and y = h(x) intersect at point P.

$$g(x) = \frac{3}{x} \qquad \qquad h(x) = \frac{x^2}{2}$$

Determine the x-coordinate of P. Round your answer to the nearest tenth.

7. Functions h and k are defined below. The graphs of y = h(x) and y = k(x) intersect at point P.

$$h(x) = \frac{5}{x} \qquad \qquad k(x) = \frac{2x^2}{3}$$

Determine the x-coordinate of P. Round your answer to the nearest tenth.

Name:

System	No Points of Intersection	One Point of Intersection	Two Points of Intersection
$y = 3 - x^2$ y = 3			
$y = 3 - x^2$ y = 2 - x			
$y = 3 - x^2$ $y = 5 - x$			

8. For each system of equations, determine the number of solutions.

9. Without using your calculator, determine how many points of intersection will occur between the functions $y = 3x^2 + 1$ and y = 9. Explain.

10. Functions r and s are defined below. The graphs of y = r(x) and y = s(x) intersect at point P.

$$r(x) = \frac{4}{x^2} \qquad \qquad h(x) = -x^2$$

Determine the x-coordinate of P. Round your answer to the nearest tenth.

11. Given the functions $f(x) = (-x)^3 - 2$ and g(x) = 7 - x, which interval(s) contain a value of x for which f(x) = g(x)?

 \Box -7 ≤ x ≤ -6
 \Box -2.5 ≤ x ≤ -1.5
 \Box 0.5 ≤ x ≤ 1.5

 \Box 0.5 ≤ x ≤ 1
 \Box 6 ≤ x ≤ 7
 \Box 9 ≤ x ≤ 10

Exit Ticket:

1. Given the functions w(x) = |x - 4| and $v(x) = x^2 - 2$, determine the integer value(s) of x for which w(x) = v(x). Describe two ways to determine the solution, as well as what the solution represents.

- 2. Write any questions you still have regarding solving non-linear systems.
- 3. Create and solve any non-linear system problem that could be solved using the ideas we worked with today.