

## HOMEWORK 10 - MATH 102

DUE DATE: Thursday, April 26

INSTRUCTOR: George Voutsadakis

Read each problem **very carefully** before starting to solve it. Four out of the eight problems will be chosen at random and graded. Each problem graded is worth 3 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Solve the following equations:

(a)  $\frac{x}{x+4} + \frac{x}{x-2} = -\frac{1}{2}$

(b)  $\frac{2x}{x-2} + \frac{x}{x-1} = \frac{7}{6}$

2. Solve the following equations using substitution:

(a)  $x^6 - 26x^3 - 27 = 0$

(b)  $y^{2/3} + 5y^{1/3} = -6$

(c)  $(x^2 + 3x) + 5\sqrt{x^2 + 3x} - 14 = 0$

3. Solve the following inequalities and graph the solution set:

(a)  $x^2 - 2x - 3 > 0$

(b)  $x^2 + 8x \leq -16$

4. Solve the polynomial inequality  $(x - 2)(x - 3)(x + 4) \leq 0$  and graph the solution set.

5. Solve the following rational inequalities and graph the solution set:

(a)  $\frac{x+5}{x-3} > 2$

(b)  $\frac{3}{x} + 1 < \frac{1}{x} - 2$

6. Find the formulas of the functions  $(f \circ g)(x)$ ,  $(g \circ f)(x)$  and  $(f \circ f)(x)$  if  $f(x) = x^2 + 3$  and  $g(x) = x - 1$ . Simplify your answers.

7. Suppose that  $f(x) = \frac{5x}{x+2}$  and  $g(x) = \frac{x}{x+3}$ . Find the domains of  $f$ , of  $g$ , of the sum  $f + g$ , of the product  $f \cdot g$  and of the quotient  $\frac{f}{g}$ .

8. Find a formula for the inverse function  $f^{-1}(x)$  if

(a)  $f(x) = \sqrt{x^7 - 3}$

(b)  $f(x) = \frac{3x-2}{2x+5}$