HOMEWORK 10 - MATH 102
DUE DATE: Friday, December 15
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) $f(x) = \frac{3x-2}{2x+5}$