BRONX COMMUNITY COLLEGE
of the City University of New York
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MTH30   **Sample Midterm Exam**

Instructions

Every problem is worth 10 points. Solve all problems and mark your answers clearly. Simplify your answers whenever possible. Show all work, using additional paper if needed. Use the provided graph paper for problems with graphing. Remember to write your name on all paperwork you hand in.

1. Find the difference quotient for the function $f(x) = x^3 - 2x + 3$.

2. If $f(x) = x - 1$ and $g(x) = x^2 + 2$, define the functions $f + g$, $f - g$, fg, $f \circ g$, and $g \circ f$.

3. Find the inverse of the function $f(x) = \sqrt{x + 2}$, and check that your answer actually is the inverse.

4. In the previous question, give the domain and range of the function f and its inverse, f^{-1}.

5. Graph the function $f(x) = (x - 2)^2 + 3$. Include x and y intercepts, the vertex, and point symmetric with the y-intercept. Graph the axis of symmetry.

6. What is the possible number of positive real roots of $f(x) = x^4 + 3x^3 - 4x^2 - x + 1$ have? What is the possible number of negative real roots?

7. Use the Remainder Theorem to evaluate $f(-2)$ where $f(x) = x^3 - 4x^2 + 2x - 1$.

8. Graph the function $f(x) = x^4 - 5x^3 + 6x^2$. Include with your graph: end behavior, all zeros with multiplicities, and number of turning points.

9. What are the possible rational zeros of $f(x) = x^3 - 2x^2 - 2x + 3$? Use synthetic division to find which is an actual zero.

10. What are the remaining actual zeros of the function $f(x)$ in Problem 9?