Math 0031-10161 _{Algebra}   Instructor: Dr. Predrag Punoševac

Exam 1

Student Name: _____
Student ID#: _____

Each problem is worth 10 points. Give a <u>complete</u> solution to receive the full credit!

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1. Replace the question mark by $\neq$ or $=$, whichever is correct.

   (a) $\left(-\frac{1}{2}\right)^{-2023}$? -2^{2023}
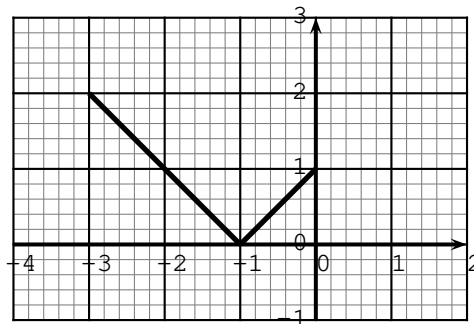
   (b) $\frac{1}{3^{-1}}$? 0.33333333333
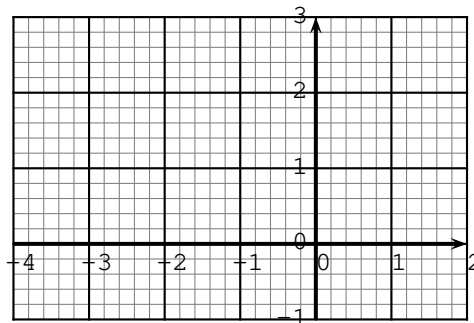
   (c) 0.065 ? 6.5%

   (d) $\sqrt{2}$? 1.41

   (e) π ? $\frac{22}{7}$

2. Find the domain and the range of the function $f(x)$ whose graph is shown below.

   Then plot the graph of the function $g(x) = f(x-1)$ using the grid provided below.

3. Plot complex number $z = 1 - 2i$ in the complex plane. What is its conjugate number.

4. Find the real values z for which function $f(z) = \sqrt{\frac{(3-z)}{(z-1)}}$ is defined.

5. Find $(f \circ f)(-5)$ for a piecewise function defined as

$$f(x) = \begin{cases} -3x - 18, & x < -5 \\ 1, & -5 \le x < 1 \\ x + 2, & x \ge 1. \end{cases}$$

6. Find the equation of the straight line which is parallel to the given one and goes through the point $(0, 2)$.
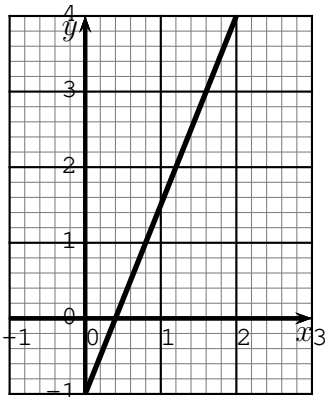
7. Find real values of x which satisfy the inequality $-3 < \frac{1}{2}(x - 4) < 5$.

8. Let $f(x) = -(x - 2023)^2 - 2$.

   (a) Find its vertex;

   (b) Determine whether it has a maximum or a minimum value;

   (c) Find the intervals on which the function is increasing.

9. Solve the inequality $\left|\frac{x-3}{4}\right| > 1$. Graph the solution on the number line, and write the solution in interval notation.

10. The graph of the function $g(x)$ is given.
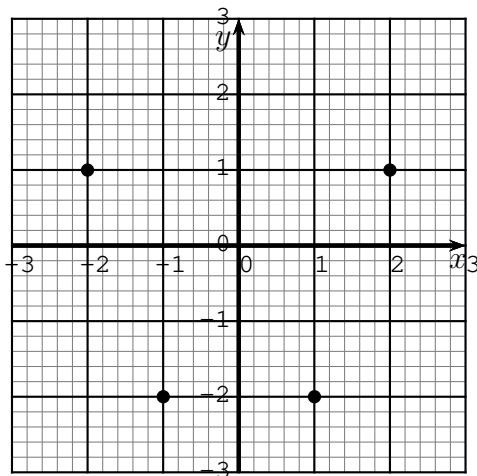
   (a) State approximately the domain of the function;

   (b) State approximately the range of the function;

   (c) State whether the function is odd, even, or neither even nor odd.