Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Write the function $f(x) = |x|$ after it has undergone the following transformations:
    a. Horizontal shift to the right of 2 $|x-2|$
    b. Vertical reflection
    c. Vertical stretch by 3 $-|x-2|$
    d. Vertical shift down by 5
                                                      $-3|x-2|$

    $$\boxed{-3|x-2|-5}$$

2. Find $f \circ g$ and $g \circ g$ for $f(x) = 3x + 7, g(x) = x^2 - 1$, and state the domain of each.

    $f \circ g = 3(x^2-1)+7 = 3x^2-3+7 = 3x^2+4$ all reals $= D$

    $g \circ g = (x^2-1)^2-1 = x^4-2x^2+1-1 = x^4-2x^2$ all reals $= D$

3. Find the inverse function $f^{-1}(x)$ for the function $f(x) = \dfrac{2x-3}{x+1}$

    $x = \dfrac{2y-3}{y+1}$ $y = \dfrac{-x-3}{x-2}$

    $xy + x = 2y-3$

    $xy - 2y = -x-3$

    $y(x-2) = -x-3$

4. Simplify, and write in standard form.
    a. $(-4 - 8i)(3 + i)$

    $-12-4i-24i-8i^2$
    $-12-4i-24i+8$
    $-4-28i$

    b. $\dfrac{3-4i}{4+3i} \cdot \dfrac{4-3i}{4-3i}$

    $\dfrac{12-9i-16i+12i^2}{16+9} = \dfrac{\cancel{12}-9i-16i\cancel{-12}}{16+9} = \dfrac{-25i}{25} = -i$