Show all work. Answers given with incomplete reasoning will not receive full credit.

**Question 1 (2 points)** If \( f(x) \) is a function with domain \([-1, 4]\) and range \((2, 4)\), find the domain and range of the function

\[
-2f(x+3) - 1
\]

So, new domain = \([-1-3, 4-3] = [-4, 1]\)
new range = \((-2\cdot4) - 1, (-2\cdot2) - 1\)
= \((-9, -5)\)

**Question 2 (2 points)** Sketch a graph of the function

\[
f(x) = -(x+1)^2 + 2
\]

\(x^2\) flip
\(x\)-axis left 1 up 2

(left 1)
(up 2)

\((0,0)\)

(left 1)
(up 2)
Question 3 (3 points) Let

\[ f(x) = \frac{x}{x + 2} \quad \text{and} \quad g(x) = -\frac{4}{x} \]

Find \((f \circ g)(x)\) and determine the domain of \((f \circ g)(x)\).

\[
(f \circ g)(x) = f(g(x)) = f\left(-\frac{4}{x}\right)
\]

\[
= \frac{-\frac{4}{x}}{\frac{-4}{x} + 2}
\]

\[
= \frac{-\frac{4}{x}}{-\frac{4 + 2x}{x}}
\]

\[
= \frac{-4}{-4 + 2x}
\]

\[
= \frac{2(-2)}{x(-2 + x)}
\]

The domain of \((f \circ g)(x)\) is the domain of \(g\) intersected with the domain of \(\frac{-2}{x-2}\).

The domain of \(g\) is \((-\infty, 0) \cup (0, \infty)\) and the domain of \(\frac{-2}{x-2}\) is \((-\infty, 2) \cup (2, \infty)\).

So, the domain of \((f \circ g)(x)\) is:

\((-\infty, 0) \cup (0, 2) \cup (2, \infty)\)