This sheet is to provide you with the information you need to achieve 90% proficiency on this gateway about Intermediate Algebra Exit Skills. As you look through the key ideas below, try to create a realistic picture of what you understand and what you don’t — the first attempt at the gateway should help you with this. While preparing for the second attempt, if necessary, you should take full advantage of working with your peers, seeking help from other students, tutors in the tutoring lab, supplemental instruction coaches and your instructor. You will not be allowed to use a calculator on this gateway.

1. Writing the function machine.
   Example: Write the function machine for \( f(x) = -\frac{1}{3}x^2 + 5 \).

   ![Function Machine Diagram]

2. Simplifying a numerical expression with fractional or negative exponents.

   Examples: 1. Simplify \( 27^{\frac{1}{3}} \)

   2. Simplify \( -3 \cdot 2^{-4} \)

3. Simplifying a rational expression with fractional exponents.

   Example: Simplify \( \left( \frac{16b^2c^5}{b^{-6}c} \right)^{\frac{1}{4}} \)

4. Given \( y = f(x) \) solve \( f(x) = a \)
Example: Given $f(x) = 3x - 5$ solve $f(x) = 4$
5. Using the graph of \( y = f(x) \) to either solve an equation of the form \( f(x) = b \) or evaluate an expression of the form \( f(b) \).

Examples: 1. Solve the equation graphically \( f(x) = -1 \).

2. Graphically evaluate the expression \( f(3) \).

6. Given a quadratic function finding all the vertical and horizontal intercepts.

Examples: 1. Find all the vertical and horizontal intercepts \( f(x) = 2x^2 - x - 1 \)

2. Finding all the vertical and horizontal intercepts \( g(x) = 3x^2 + x - 14 \)

7. Given the equation of a parabola in vertex form, \( f(x) = a(x - h)^2 + k \), identifying the coordinates of the vertex.

Examples: 1. Identify the coordinates of the vertex \( f(x) = \frac{1}{2}(x + 2)^2 - 1 \)

2. Identify the coordinates of the vertex \( g(x) = (x - 3)^2 + 5 \)

3. Identify the coordinates of the vertex \( h(x) = 4(x + 7)^2 + 2 \)
8. Solving a linear inequality.

Examples: 1. Solve \( 4 + 5x < 9 \)

2. Solve \( 1 - 2x \geq 3 + 7x \)

9. Solving a linear absolute value equation.

Examples: 1. Solve \( |2x - 5| = 8 \)

2. Solve \( |3x + 4| = 8 \)

10. Interpreting slope and intercepts.

Example: Let \( M(t) \) represent the annual consumption of milk in gallons per person and let \( S(t) \) represent the annual consumption of soft drinks in gallons per person in the year that is \( t \) years since 1950. These can be modeled by the linear functions

\[
M(t) = -0.23t + 35.64 \\
S(t) = 0.88t + 8.37
\]

1. Which was consumed more in 1950, milk or softdrinks? How do you know?

2. Which is increasing more rapidly, the consumption of milk or the consumption of soft drinks? How do you know?