

1. **(20 points)** Answer the following questions concerning applications of algebra.
- (a) **(8 points)** At noon, András starts walking westwards from campus at 4 miles per hour; at 2 PM, Borbála starts bicycling east from campus at 12 miles per hour. If t is the number of hours that have passed since noon, give an expression for the distance between András and Borbála in terms of t .
- (b) **(12 points)** If you have access to unlimited quantities of two different brine solutions which are 30% salt and 80% salt, how much of each solution should you mix together to get 10 liters of a 40%-salt brine?
2. **(15 points)** Simplify the following expressions.
- (a) **(5 points)** $(3 + 4i)(1 - 2i) + (2 - i)$.
- (b) **(5 points)** $\frac{x-1}{x+1} + \frac{x+1}{x-1}$.
- (c) **(5 points)** $\frac{(x^2y)^3}{y^{-1}}$.

FOR GRADER USE ONLY	
1	/20
2	/15
3	/20
4	/20
Σ	/75

3. **(20 points)** Find all real values satisfying the following inequalities, given either as conditions or as intervals:

(a) **(5 points)** $-8r - 5 \leq -2$.

(b) **(7 points)** $x^2 - x - 8 > x$.

(c) **(8 points)** $\frac{4x-9}{1-x} \leq 0$.

4. **(20 points)** Find all real solutions to the following equations:

(a) **(8 points)** $\frac{x}{x-3} = x + 1$.

(b) **(5 points)** $4(t - 2) = 12$.

(c) **(7 points)** $2u^2 + 5u - 3 = 4u^2 - u$.