

Homework I

Tom Kelliher, CS 240

50 points, due Feb. 8

1. Use **truth tables** to verify each of the following:

- (a) De Morgan's theorem for three variables: $\overline{XYZ} = \overline{X} + \overline{Y} + \overline{Z}$.
- (b) $X + YZ = (X + Y)(X + Z)$ (Identity 15 from Feb. 1's notes).
- (c) $\overline{XY} + \overline{YZ} + X\overline{Z} = X\overline{Y} + Y\overline{Z} + \overline{XZ}$

2. Use **Boolean manipulation** to verify each of the following:

- (a) $\overline{X} \cdot \overline{Y} + \overline{XY} + XY = \overline{X} + Y$
- (b) $\overline{AB} + \overline{B} \cdot \overline{C} + AB + \overline{BC} = 1$
- (c) $(X + Y)(X + \overline{Y}) = X$
- (d) $X(X + Y) = X$