

# Homework I

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25 points, due Feb. 3

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 Jan. 27'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)  $X(X + Y) = X$