Due Thursday, March 5, 2015 before 9PM EST. Upload a PDF of your answers at https://canvas.harvard.edu/courses/1815/assignments/19890

1. Let X and Y be sets. Provide a formula for the cardinality of the set $A = (X \times Y) - (Y \times X)$ in terms of the cardinalities of X, Y, $X - Y$, and $Y - X$.

   Solution:

   Cardinality of the set $A = \{(X \times Y) - (Y \times X)\}$

   $$= (|\{\{X - Y\} \times Y\}|) + (|\{X - \{X - Y\}\} \times \{Y - X\}|)$$

   We can write cardinality of $|P \times Q| = |P| \times |Q|$ (where P and Q are 2 sets)

   $$= (|\{X - Y\}| \times |Y|) + (|\{X - \{X - Y\}\}| \times |\{Y - X\}|)$$