AP® COMPUTER SCIENCE A
2016 CANONICAL SOLUTIONS

Question 3: Crossword

Part (a):

```
private boolean toBeLabeled(int r, int c, boolean[][] blackSquares)
{
      return (!(blackSquares[r][c]) &&
              (r == 0 || c == 0 || blackSquares[r - 1][c] ||
               blackSquares[r][c - 1]));
}
```

Part (b):

```
public Crossword(boolean[][] blackSquares)
{
      puzzle = new Square[blackSquares.length][blackSquares[0].length];
      int num = 1;

      for (int r = 0; r < blackSquares.length; r++)
      {
            for (int c = 0; c < blackSquares[0].length; c++)
            {
                  if (blackSquares[r][c])
                  {
                        puzzle[r][c] = new Square(true, 0);
                  }
                  else
                  {
                        if (toBeLabeled(r, c, blackSquares))
                        {
                              puzzle[r][c] = new Square(false, num);
                              num++;
                        }
                        else
                        {
                              puzzle[r][c] = new Square(false, 0);
                        }
                  }
            }
      }
}
```

These canonical solutions serve an expository role, depicting general approaches to solution. Each reflects only one instance from the infinite set of valid solutions. The solutions are presented in a coding style chosen to enhance readability and facilitate understanding.