

Name: _____

ID: _____

1. Find the maximum value of

$$P = 2pq + 2pr + 2rq$$

subject to the constraint $p + q + r = 1$.

P represents the probability of that you get two different colors when you draw from a jar with purple, quartz, and red marbles, where the proportion of each color of marble is p , q , and r , respectively. For a more relevant example, replace “marbles” with “genes that determine blood type” and “red, green, and blue” with “A, B, and O.”

2. Let R be the rectangle $[0, 3] \times [1, 2]$. Evaluate the integral

$$\iint_R x^2 y \, dA.$$

You may want to evaluate the integral in more than one way in order to check your work, but you'll get full credit if you just do it one way.