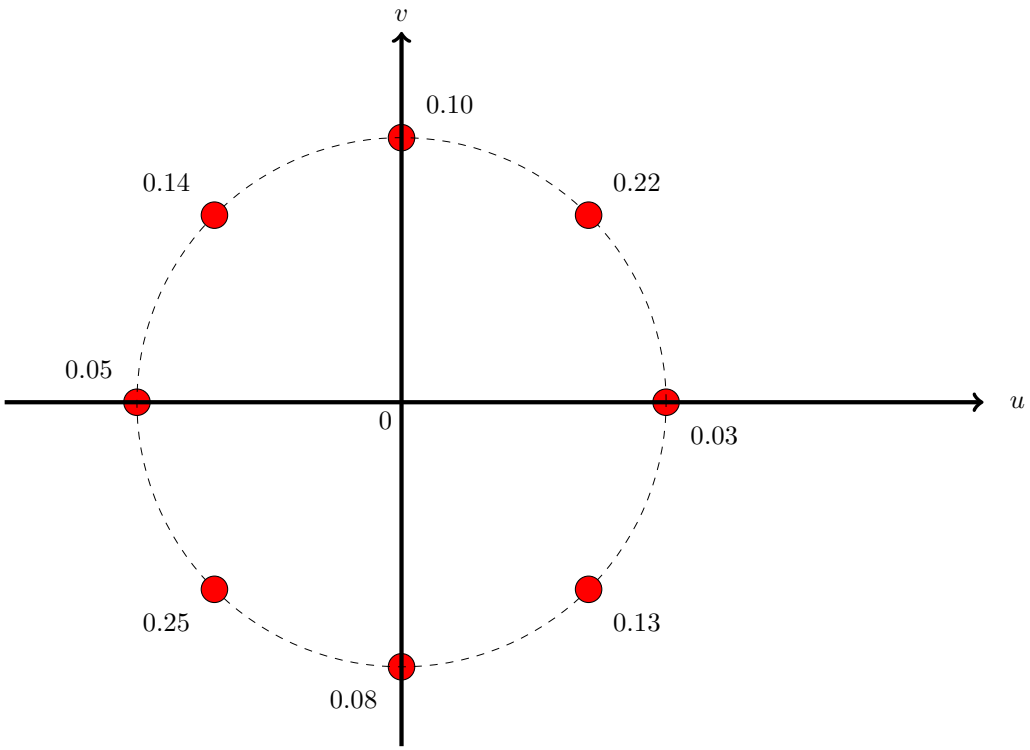
Suppose X and Y are random variables whose joint probability mass function consists of the 8 red points on the unit circle shown below. What is the probability that $(X-1)^2+(Y+1)^2$ is less than or equal to one?



(a) 0.24

(b) 0.13

(c) 0.16

(d) 0.21

(e) 0.35

(f) 0.22

(g) 0.25

(h) 0.38

(i) 0.29

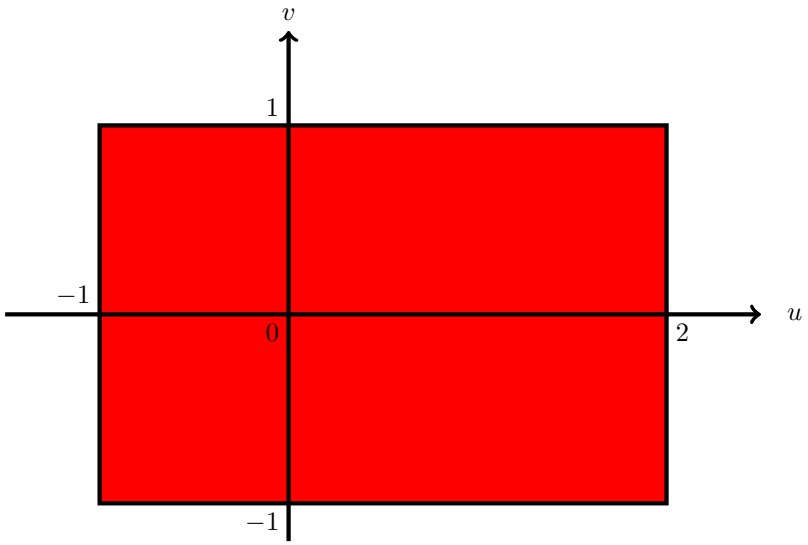
(j) 0.14

(k) 0.46

(l) 0.71

(m) None of these

If X and Y are random variables whose joint probability density function is $f_{X,Y}(u,v) = 2e^{-(u+2v)}$ in the first quadrant, and zero elsewhere, then what is the probability the point (X,Y) lies in the red region shown below?



(a) $(1-e^{-2})^2$

(b) $1-e^{-2}$

(c) $(1-e^{-1})^2$

(d) $(1-e^{-1})(1-e^{-2})$

(e) $2(1-e^{-2})^2$

(f) $2(1-e^{-1})(1-e^{-2})$

(g) $1-e^{-3}$

(h) $e^{-1}-e^{-2}$

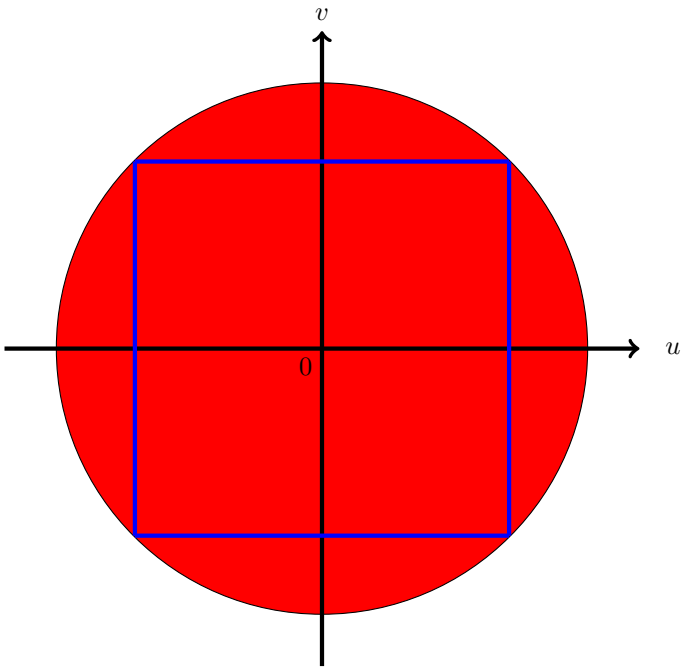
(i) $(e^{-1}-e^{-2})^2$

(j) $\frac{1}{2}(1-e^{-2})^2$

(k) $(e-e^{-2})(e-e^{-1})$

(l) None of these

Suppose a dart is thrown at the plane and lands at location (X, Y), where X and Y are random variables whose joint probability density function is uniform in the red circle shown below. What is the probability that the dart lands inside the inscribed blue square shown?



(a) $2/\pi$

(b) $1/\pi$

(c) $\pi/2$

(d) π

(e) $\sqrt{2}/\pi$

(f) $4/\pi$

(g) 4

(h) $\sqrt{2}$

(i) 2

(j) $2\sqrt{2}/\pi$

(k) 1

(l) None of these