Green's Theorem.

Spring 2016

Attendance Quizzes

April 15, 2016

Quiz 28 Green's Theorem.

Use Green's theorem to calculate the area enclosed by the x-axis and the curve $r(t) = <\cos(3t), \sin(2t)>$ as t goes from 0 to $\pi/2$. You should set up the correct integrals and then evaluate the area. You may need the formula

$\cos(A)\cos(B) = \frac{1}{2}(\cos(A+B) + \cos(A-B))$.

Answer: If we consider points $P(0,0)$ and $Q(1,0)$, then the boundary curve is the line PQ followed by the curve going from Q to P.

We use the integral of $x\,dy$ on this curve.

Clearly, we get 0 on PQ and on the curve from Q to P, we have:

$$\int_0^{\pi/2} 2\cos(3t)\cos(2t)\,dt = 6/5.$$

To get this, we note that the integrand is $\cos(5t) + \cos(t)$.