Math 20E

August 14, 2012

Question 1 In order for a transformation $T : R \to S$ to be a coordinate transformation that can be used to change variables in a double or triple integral, it should

A. be a one-to-one mapping mapping of R

B. map R onto S

C. both **A** and **B**

*__D.__ both **A** and **B**, except that would be OK if it failed to be one-to-one on parts of the boundary of R

E. none of the above: "one-to-one" and "onto" have nothing to do with coordinate transformations.

Question 2 Given domains $D \subset \mathbb{R}^2$ and $S \subset \mathbb{R}^2$ and a one-to-one transformation $T : D \to S$ that maps D onto S. Then T can be used to change variables as follows:

A. $$\iint_S f(x,y)\,dx\,dy = \iint_D f\left(T\left(u,v\right)\right)\,\left|\det\left[\mathbf{D}T\left(u,v\right)\right]\right|\,du\,dv.$$

B. $$\iint_D f(u,v)\,du\,dv = \iint_S f\left(T\left(x,y\right)\right)\,\left|\det\left[\mathbf{D}T\left(x,y\right)\right]\right|\,dx\,dy.$$

C. $$\iint_D f(u,v)\,du\,dv = \iint_S f\left(T^{-1}\left(x,y\right)\right)\,\left|\det\left[\mathbf{D}T^{-1}\left(x,y\right)\right]\right|\,dx\,dy.$$

D. Both **A** and **B**

***E.** Both **A** and **C**

Question 3 The speed of an object is constant. The object's

*A. velocity and acceleration are perpendicular.

B. acceleration is zero.

C. velocity is constant.

D. both **B** and **C**.