Calculus III. Extra Review for Final with answers.

1. First study your 3 midterm tests and 11 quizzes. For extra problems study the 3 online reviews.

2. Let \( \vec{F} = \langle y^2, 2x, z^3 + \sin(x) \rangle \) and \( S \) be the surface \( z = e^{(x+y)} \) over the domain \( D \), which is the triangle in the \( xy \)-plane with vertices \((0,0), (2,0), (1,2)\). Let \( S \) have boundary curve \( \partial S = C \).
   Use Stoke’s theorem to set up \( \int_C \vec{F} \cdot d\vec{r} \).

   A: 
   \[
   \int_0^2 \int_{2-y}^{2-\frac{y}{2}} ((\cos x)e^{x+y} + 2^x \ln 2 - 2y)dxdy.
   \]

3. Let \( \vec{F} = \langle 6y + e^x, y^2 + 8x, z^3 + \sin(z) \rangle \) and \( S \) be the surface \( z = x^3y \) over the domain \( D \) which is inside the radius 3 circle around the origin in the \( xy \)-plane. Let \( S \) have boundary curve \( \partial S = C \).
   Use Stoke’s theorem to find \( \int_C \vec{F} \cdot d\vec{r} \).

   A: \( 18\pi \)