

EXAM 3

Math 212, 2015-2016 Fall, Clark Bray.

You have 50 minutes.

No notes, no books, no calculators.

YOU MUST SHOW ALL WORK AND EXPLAIN ALL REASONING
TO RECEIVE CREDIT. CLARITY WILL BE CONSIDERED IN GRADING.

All answers must be simplified. All of the policies and guidelines
on the class webpages are in effect on this exam.

Good luck!

Name _____

“I have adhered to the Duke Community
Standard in completing this
examination.”

1. _____

2. _____

3. _____

4. _____

5. _____

Signature: _____

Total Score _____ (/100 points)

1. (20 pts) The surface S is the part of the paraboloid $z = x^2 + y^2 - 4$ that is below the xy -plane, oriented downward. Compute the flux through S of the vector field $\vec{F}(x, y, z) = (1+y, 2+z, 3+x)$.

2. (20 pts) The surface S is the boundary of the tetrahedron T bounded by $x + 2y + 3z = 6$ and the coordinate planes. Compute the flux through S of the vector field $\vec{F}(x, y, z) = (xz + y^2, yz + x^2, xy - z^2 + z)$.

3. (20 pts) The curve C is parametrized by $\vec{r}(t) = (t^2 + 1, 2t - 3t^2, t^3)$, starting at $t = 0$ and ending at $t = 1$. Compute the line integral along C of the vector field $\vec{F}(x, y, z) = (ye^{xy} + z, xe^{xy}, x)$.

4. (20 pts) The curve C is the unit circle in the yz -plane, oriented clockwise as seen from the positive part of the x -axis. Compute the line integral along C of the vector field $\vec{F}(x, y, z) = (yz + z, xz + x, xy + y)$.

5. (20 pts) The surface S_1 is the part of the cylinder $x^2 + y^2 = 1$ with $y \geq 0$, and the surface S_2 is the plane $y = z$; the curve C is the intersection of these two surfaces, oriented in the negative x -direction. Compute the line integral along C of the vector field $\vec{F}(x, y, z) = (y, z, x)$.