

EXAM 2

Math 212, 2014-2015 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. (15 pts) Find the equation of the plane tangent to the surface with equation $z = 3x^2 - 5y^2$ at the point $(2, 1, 7)$.

2. (20 pts) The domain D is the part of the disk $x^2 + y^2 \leq 4$ that is both outside of the circle $x^2 + y^2 = 1$ and above the x -axis. The density is $\delta = (x^2 + y^2)^{-2}$. Compute the location of the centroid of this solid.

3. (25 pts) The solid R is bounded by the paraboloid $z = r^2 - 12$ and the cylinder $y^2 + z^2 = 1$. Density is given by $\delta = e^z$. Write down, but do not evaluate, a triple iterated integral that represents the moment of inertia of this solid around the line described by $x = 3$ and $y = 7$.

4. (20 pts) The surface S is the part of the paraboloid $x^2 + y + z^2 = 9$ with $y \geq 0$. Write down, but do not evaluate, a double iterated integral representing the surface integral $\iint_S y \, dS$.

5. (20 pts) Write down the spherical coordinates change of variables function (giving x , y , and z as functions of ρ , ϕ , and θ), and compute $\frac{\partial(x, y, z)}{\partial(\rho, \phi, \theta)}$ directly from the definition.