Date: July 9, 2013, Tuesday NAME:.....

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Math 102 Summer 2013 – QUIZ # 8 – Section 001

Find the area of the part the plane $2x + 5y + z = 10$ that lies inside the cylinder $x^2 + y^2 = 9$.

Solution: The area of the surface with equation $z = f(x, y)$ with $(x, y) \in D$, where f_x and f_y are continuous, is

$$A(S) = \iint_D \sqrt{[f_x(x, y)]^2 + [f_y(x, y)]^2 + 1}\, dA.$$

In our case $z = f(x, y) = 10 - 2x - 5y$. Then $f_x = -2$, $f_y = -5$ and D is the circle $x^2 + y^2 = 9$ whose area is 9π. Then

$$A(S) = \iint_D \sqrt{(-2)^2 + (-5)^2 + 1}\, dA = \sqrt{30} \iint_D dA = (\sqrt{30})(9\pi).$$