"QUIZ" for Lecture 20

NAME: (print!) SAI EMBAR **Section:** 23

E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q20FirstLast.pdf) ASAP BUT NO LATER THAN Nov. 16, 8:00pm

1. Find an equation for the tangent plane to the parametric surface

$$x = v^2 \quad , \quad y = u + v \quad , \quad z = u^2 \quad ,$$

at the point $(1, 2, 1)$. Simplify as much as you can!

$r(t) = \langle v^2, u+v, u^2 \rangle$

$r_u = \langle 0, 1, 2u \rangle$

$r_v = \langle 2v, 1, 0 \rangle$

$1 = v^2, \; 2 = u+v, \; 1 = u^2$

$v = -1$ or 1, $u = -1$ or 1, but only $u=1$ and $v=1$ work.

$r_u = \langle 0, 1, 2 \rangle$

$r_v = \langle 2, 1, 0 \rangle$

$n = \langle 0, 1, 2 \rangle \times \langle 2, 1, 0 \rangle = \langle -2, 4, -2 \rangle$

$\langle x-1, y-2, z-1 \rangle \cdot \langle -2, 4, -2 \rangle = 0$

$\boxed{x - 2y + z = -2}$

2. Evaluate the surface integral

$$\int\int_S z \, dS \quad ,$$

where S is the triangular region with vertices $(2, 0, 0), (0, 2, 0), (0, 0, 2)$.

$x + y + z = 2$

$z = 2 - x - y$

$g(x,y) = 2 - x - y$, $g_x = -1$, $g_y = -1$ and $\sqrt{1 + g_x^2 + g_y^2} = \sqrt{3}$

$\iint_S z \, ds = \iint_D (2 - x - y)\sqrt{3}$

$D = \{(x, y) \mid x \geq 0, y \geq 0, x + y \leq 2\}$

$\int_0^2 \int_0^{2-x} \sqrt{3} \, dy \, dx$

$= \int_0^2 \sqrt{3}(2 - x) \, dx = \sqrt{3}\left(2x - \frac{x^2}{2}\right)\Big|_0^2 = \boxed{2\sqrt{3}}$