

"QUIZ" for Lecture 20

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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

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

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

$$\begin{aligned} r &= v^2 \hat{i} + (u+v)\hat{j} + u^2 \hat{k} \\ r_u &= 0\hat{i} + \hat{j} + 2u\hat{k} \quad r_v = 2v\hat{i} + \hat{j} + 0\hat{k} \end{aligned}$$

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$$\begin{aligned} v^2 &= 1 \\ u+v &= 2 \\ u^2 &= 1 \end{aligned}$$

$u=1$	$v=1$
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$$r_u(1) = 0\hat{i} + \hat{j} + 2\hat{k} \quad r_v(1) = 2\hat{i} + \hat{j} + 0\hat{k}$$

$$r_u \times r_v = (0-2)\hat{i} - (0-4)\hat{j} + (-2)\hat{k} = \langle -2, +4, -2 \rangle$$

Ans

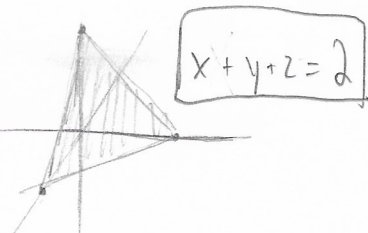
$$\begin{aligned} -2(x-1) + 4(y-2) - 2(z-1) &= 0 \\ &= (x-1) - 2(y-2) + (z-1) = 0 \\ &= x - 2y + z = -2 \end{aligned}$$

2. Evaluate the surface integral

$$\iint_S z \, dS,$$

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

$$z = 2 - x - y \quad dS = \sqrt{1 + (-1)^2 + (-1)^2} \, dA = \sqrt{3}$$



$$\int_0^2 \int_0^{2-x} (2-x-y)\sqrt{3} \, dA \quad \begin{matrix} 0 \leq x \leq 2 \\ 0 \leq y \leq 2-x \end{matrix}$$

$$= \int_0^2 \int_0^{2-x} (2-x-y)\sqrt{3} \, dx \, dy = \sqrt{3}$$

Done In Maple