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2017 Exam 2

1. $X = UV \quad Y = VW \quad Z = U + V$ at $(3, 3, 3)$

$$\begin{vmatrix} V & U & 0 \\ 0 & W & V \\ 1 & 1 & 0 \end{vmatrix} \qquad \begin{vmatrix} 3 & 3 & 0 \\ 0 & 3 & 3 \\ 1 & 1 & 0 \end{vmatrix}$$

$-3i + 3j - 3k \qquad -3 + 3 - 3 = -3$

Type: Number
Ans: -3

$xz + zy$

2.

$F = \langle z, z, xy \rangle$

$(1-1)\hat{i} - (1-1)\hat{j} + (0-0)$

$0\hat{i} - 0\hat{j} + 0\hat{k}$

11.

$\int z$

$z = f(x,y)$

$f_y = f_y(x,y)$

$z = f_y(x,y)$

$F = z + z$

$F_z = \hat{i} + \hat{j} + f(y)$

$xy - z = f(y)$

equation

$= z + z + x + y - z$

11. $\langle \sin t, \cos t + 2, \sin t \rangle \quad 0 \le T \le \pi$

$\langle 0, 3, 0 \rangle$

$\langle 0, 1, 0 \rangle$

$f(0,1,0) - f(0,3,0)$

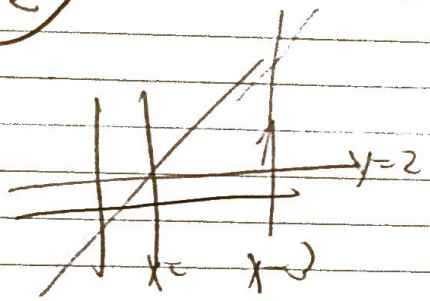
$0 + 0 + 0 + 1 - 2 - (0 + 0 + 0 + 3 - 2)$

$-1 - 1 = -2$

3. $\int_1^3 \int_2^{6x} F(x,y)\, dy\, dx$

integral

$\int_2^{18} \int_{\frac{1}{6}y}^{\frac{1}{2}y} f(x,y)\, dx\, dy$



4. Use smulles vale to find $2x+2y+z$ and $xyz=2$

$\langle 2,2,1 \rangle$

$\lambda \langle yz, xz, xy \rangle$

$2 = \lambda(yz)$ $\quad \frac{2}{\lambda z} = \lambda$

$2 = \lambda(xz)$

$1 = \lambda(xy)$

$z = yz$

$2 = xz$

$1 = xy$

$\frac{2}{\lambda y} = z$ $\quad \frac{xy2}{\lambda}$

$\frac{2x}{\lambda} = 2$

$\frac{2}{\lambda^2 z} = 2$

$\lambda = 1$

$2(1)+2(2)+2(2)$

$2+4+4$

(10)

number

5 $\iiint xyz\,dv$

on $0 \le x \le 1 \le 5 \le 6$

$$\int_0^6 \int_0^5 \int_0^1 xyz\,dx\,dy\,dz$$

$$\frac{x^2}{2} yz \Big|_0^1$$

$$\int_0^5 \frac{yz}{2}\,dy$$

$$\frac{x^2 z}{4} \Big|_0^5$$

$$\int_0^6 \frac{25}{4} z\,dz$$

$$\frac{25}{8}(0) = \frac{150}{8} = \frac{75}{4}$$

number

6. convert to polar cordinates and one

$$\int_{-2}^{2}\int_{0}^{\sqrt{2-x^2}} x^2+y^2 \, dy \, dx$$

$$\int_{0}^{\pi}\int_{0}^{\sqrt{2}} r^2 \, dr \, d\theta$$

$$\frac{r^3}{3}\Big|_0^{\sqrt{2}}$$

$$\int_0^{\pi} \frac{2\sqrt{2}}{3} \, d\theta$$

$$\frac{2\sqrt{2}\pi}{3}$$ ← number

7. $\int_C 2xyz\,ds$ on $(0,0,0)$ to $(3,3,3)$

$x = 3t$

$y = 3t$

$z = 3t$

$$\int_0^1 2(3t)(3t)(3t)\,dt$$

$$54\int_0^1 t^3\,dt$$

$$\frac{t^4}{4}\Big|_0^1$$

$$54\left(\frac{1}{4}\right) - 0 = \frac{54}{4} = \frac{27}{2}$$

↓ number

8. Compute

$$\int_0^3 \int_{2x}^{4} x^2 \, dx \, dy$$

$$\frac{x^3}{3}\Big|_{2x}^{4}$$

$$\int_0^3 \frac{64}{3} - \frac{8x^3}{3} \, dx$$

$$\frac{64}{3}(3) - \frac{8x^3}{3}(3) - 64 - 8x^3$$

↑ multivariable function

9. $\int\int\int x^2 y^2 z^2 \, dV$

or $x^2+y^2+z^2 \leq 1$

$$\int_0^1 \int_0^{\pi} \int_0^{2\pi} \rho^2 \rho^2 \sin\phi \, d\phi \, d\theta \, d\rho$$

$$\int_0^1 \rho^4 \, d\rho \int_0^{\pi} \sin\phi \, d\phi \int_0^{2\pi} d\theta$$

$$\frac{\pi}{5}$$ ← Nice

10. Find V.F if

$\langle 2x, 3x^2y, 4zx \rangle$

$\int 2x\,dx$

$F = x^2 + h(y,z)$

$F_y = h_y(y,z)$

$3x^2y = h_y(y,z)$

$F = x^2 + 3x^2y$

$\int x^2y\,3x^2y\,dy$

$x^2y + 3x^2\frac{y^2}{2} + h(y)$

$4zx = h_z(y)$

$x^2y + 3x^2\frac{y^2}{2} + 4zx$

↙ multivariable function