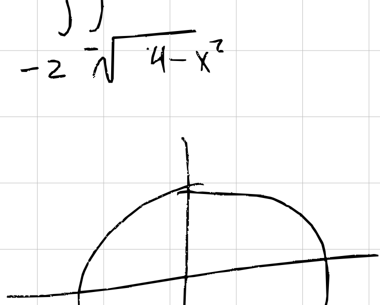
1 $\int_0^{2\pi} 1 - \sin\theta \, d\theta = 2\pi$

2 $\int_{-2}^{2}\int_{\sqrt{4-x^2}}^{\sqrt{4-x^2}} \cos(x^2+y^2)\, dA$



$r = 2$

$\int_0^{2\pi}\int_0^{2} \cos(r^2)\, r\, dr\, d\theta =$

$u = r^2$

$\frac{du}{dr} = 2r$

$\frac{du}{2} = r\,dr$

$\int_0^{2\pi}\frac{1}{2}\int_0^{4} \cos(u)\, du\, d\theta$

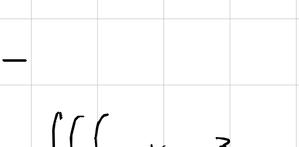
$\int_0^{2\pi} \frac{1}{2}(\sin(r^2))\Big|_0^2 \, d\theta$

$\int_0^{2\pi} \frac{1}{2}\sin(4)\, d\theta = \pi \sin(4)$

3 –

$\iiint_S x y^3 z \, dV \qquad S = [-1,3]\times[0,1]\times[1,3]$

17 – $\bar{F} = \langle yx^2, xy^2 - 3z^4, x^3 + y^2\rangle$



$R = 4$

$2xy + 2xy + 0$

$\iiint_A 4xy\, dA$

$\frac{1}{4}$ of a sphere

16 – Use strokes theorem

$\int_C \bar{F}\cdot d\bar{r} = \iint (\nabla\times\bar{F})\cdot\bar{n}$

$\downarrow$

$\int \bar{G}\cdot\bar{n} = \iint G\cdot(t_u \times t_v)\, dA$

$\bar{F} = \langle z^2, y^2, x\rangle$

$\left(\frac{\partial h}{\partial y} - \frac{\partial g}{\partial z}\right) = (0-0)$

$\left(\frac{\partial f}{\partial z} - \frac{\partial h}{\partial x}\right) = (2z-1)\,\vec{j}$

$\left(\frac{\partial g}{\partial x} - \frac{\partial f}{\partial y}\right) = (0-0)$

$\langle 0, 2z-1, 0\rangle$

P $(1,0,0)$
Q $(0,1,0)$
R $(0,0,1)$

$\vec{i} \quad \vec{j} \quad \vec{k}$

$\overrightarrow{PQ} = \langle -1, 1, 0\rangle$
$\overrightarrow{PR} = \langle -1, 0, 1\rangle$

$\dot{1}$

$0 = (x-1) + y + z$

$\langle 1, 1, 1\rangle$

$\langle 1+t, t, -t\rangle$

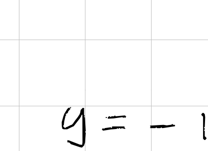
$1 + x + y - z = 0$

$y = -1 - x$

$1 + x + y = 2$

Set $z = 0$ ✓

$\int_0^{1}\int_0^{-1-x} -(1+x+y)\, dx\, dy$



$0 = (x-1) + y + z$

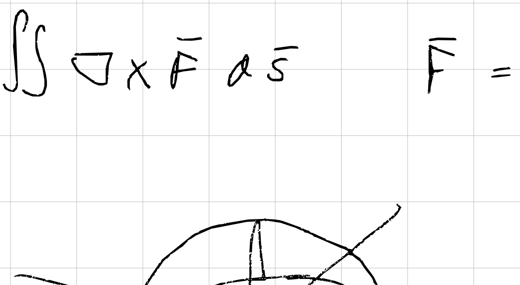
$1 - x - y = z$

$\iint_A 2(1-x-y)\, dA = \iint 2 - 2x - 2y\, dA$

$\int_0^{1}\int_0^{y-1} 2 - 2x - 2y\, dx\, dy = -1 \quad x = y - 1$

15

$\iint \nabla\times\bar{F}\, d\bar{s} \qquad \bar{F} = \langle y, -x, yx^3\rangle$



$\left(\frac{\partial h}{\partial y} - \frac{\partial g}{\partial z}\right) = (x^3 - (0)) = x^3$

$\left(\frac{\partial f}{\partial z} - \frac{\partial h}{\partial x}\right) = (0 - 3yx^2) = -3yx^2$

$\left(\frac{\partial g}{\partial x} - \frac{\partial f}{\partial y}\right) = (-1 - 1) = -2$

$\underset{G}{\langle x^3, -3yx^2, -2\rangle}$

$\iint \bar{G}\cdot\bar{n}\, ds = \int$

$x^2 + y^2 + z^2 = 16$

$\langle 4\cos u \sin v, 4\sin u \sin v, 4\cos u\rangle$

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -4\sin u \sin v & 4\cos u \sin v & -4\sin u \\ 4\cos u \cos v & 4\sin u \cos v & 0 \end{vmatrix}$$

$16\sin^2 u \cos v$

$16 \sin u \cos u \cos v$

$-16\sin^2 u \sin v \cos v - 16\cos u^2 \sin v \cos v$

$\hookrightarrow -16 \sin v \cos v$

$G \Rightarrow \langle (16\sin^2 u \cos v)^3, -3(16\sin u \cos u \cos v)(16\sin^2 u \cos v)^2 \ldots$

$\langle 16\sin^2 u \cos v, 16\sin u \cos u \cos v, -16 \sin v \cos v\rangle$

-2

Monstrous

14 $\quad F = \langle -x, 2y, -z\rangle \qquad y = 3x^2 + 3z^2$

$y = 6$

Fulk F

$\oint_C F\cdot\bar{n}$

$\rho \sin\varphi$