**IFSMG- PCS**
**ENGENHARIA DA COMPUTAÇÃO- 3º PERÍODO**
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## Prova 1

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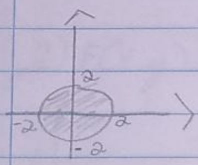
### Região II




$x^2+y^2=4$

$y = \pm\sqrt{4-x^2}$

$$\int_{-2}^{2}\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} xy\sqrt{x^2+y^2}\,dy\,dx \Rightarrow \int_{-2}^{2} x \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} y\sqrt{x^2+y^2}^{\,2}\,dx \Rightarrow$$

$$\int_{-2}^{2} x \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \frac{1}{2} \cdot \sqrt{t}\,dt \Rightarrow \int_{-2}^{2} x\,\frac{1}{2}\,\frac{2t\sqrt{t}}{3}\Bigg|_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \Rightarrow \int_{-2}^{2} \frac{x\sqrt{x^2+y^2}\,(x^2+y^2)}{3}\Bigg|_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}}$$

$$\frac{x\sqrt{\cancel{x^2}+4-\cancel{x^2}}\,(\cancel{x^2}+4-\cancel{x^2})}{3} - \frac{x\sqrt{\cancel{x^2}+4-\cancel{x^2}}\,(\cancel{x^2}+4-\cancel{x^2})}{3} \Rightarrow \frac{x\sqrt{4}\,.(4)}{3} - \Rightarrow$$

$$\frac{x\sqrt{4}\,(+4)}{3} \Rightarrow \frac{8x}{3} - \frac{8x}{3} \Rightarrow 0//$$

### Região III

$$\int_{-2}^{+2}\int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} xy\sqrt{x^2+y^2}\,dx\,dy \Rightarrow \int_{-2}^{2} y \int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} x\sqrt{x^2+y^2} \Rightarrow$$

$$\int_{-2}^{2} y \int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} \frac{1}{2}\sqrt{t} \Rightarrow \int_{-2}^{2} y\,\frac{1}{2}\int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} t^{\frac{1}{2}}\,dt \Rightarrow \int_{-2}^{2} y\,\frac{1}{2}\,\frac{2t\sqrt{t}}{3}\Bigg|_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}}$$

$$\int_{-2}^{2} y \frac{1}{2} \frac{2(x^2+y^2)\sqrt{x^2+y^2}}{3} \Bigg|_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} \Rightarrow \int_{-2}^{2} \frac{y\sqrt{x^2+y^2}(x^2+y^2)}{3} \Bigg|_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} \Rightarrow$$

$$\frac{y\sqrt{y^2+4-y^2}(y^2+4-y^2)}{3} - \frac{y\sqrt{y^2+4-y^2}(y^2+4-y^2)}{3} \Rightarrow \frac{y\sqrt{4}.4}{3} - \frac{y\sqrt{4}.4}{3}$$

$$\frac{y2.4}{3} - \frac{y2.4}{3} \Rightarrow \frac{8y}{3} - \frac{8y}{3} = 0$$

## Região IV

$$\int_{-2}^{2}\int_{0}^{2\pi} r\cos\theta . r\,\text{sen}\theta \sqrt{r\cos\theta^2 + r\,\text{sen}\theta}\;\; r\, d\theta\, dr \Rightarrow \int_{-2}^{2}\int_{0}^{2\pi} r^2\cos\theta . r^2\text{sen}\theta \sqrt{r^2\cos\theta^2 + r^2\text{sen}\theta^2}$$

$$\int_{-2}^{2}\int_{0}^{2\pi} r^2\cos\theta . r^2\text{sen}\theta \sqrt{r^2(\cos\theta^2+\text{sen}\theta^2)} \Rightarrow \int_{-2}^{2}\int_{0}^{2\pi} r^2\cos\theta\; r^2\text{sen}\theta \sqrt{r^2.1} \Rightarrow$$

$$\int_{-2}^{2}\int_{0}^{2\pi} r^2\cos\theta . r^2\text{sen}\theta . r \Rightarrow \int_{-2}^{2} r^2\text{sen}\theta + r^2\cos\theta . r \Bigg|_{0}^{2\pi} \Rightarrow \int_{-2}^{2} r^2 . r^2 . r\; dr \Rightarrow \frac{r^6}{6}\Bigg|_{-2}^{2}$$

$$\frac{2^6}{6} - \frac{2^6}{6} = 0$$

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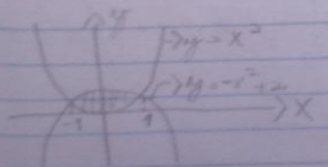
## Região II




$$x^2 = -x^2+2$$

$$2x^2 = 2 \Rightarrow x^2 = 1 \Rightarrow x = \pm 1$$

$$\int_{-1}^{1}\int_{x^2}^{-x^2+2} x + y\; dy\, dx \Rightarrow \int_{-1}^{1}\int_{x^2}^{-x^2+2} xy + \frac{y^2}{2} \Rightarrow$$

$$\int_{-1}^{1}\left[x(-x^2+2)+\frac{(-x^2+2)^2}{2}\right]-\left[(x.x^2)+\frac{(x^2)^2}{2}\right]dx \Rightarrow$$

$$\int_{-1}^{1}\left(-x^3+2x+\frac{4+x^4-4x^2}{\cancel{2}}\right)-x^3-\frac{x^4}{\cancel{2}}\,dx \Rightarrow \int_{-1}^{1}(-2x^3-2x^2+2x+2)\,dx$$

$$\left[\frac{-2x^4}{4}-\frac{2x^3}{3}+\frac{\cancel{2}x}{\cancel{2}}+2x\right]\Big|_{-1}^{1} \Rightarrow \left(\frac{-2}{4}-\frac{2}{3}+1+2\right)-\left(\frac{2}{4}+\frac{2}{3}+1-2\right)$$

$$\frac{-2}{3}+2-\frac{2}{3}+2 \Rightarrow \frac{2\times 3}{3}+\frac{2}{3} \Rightarrow \frac{8}{3}$$

## Região III

$f(x,y)=x+y$

$y=x^2 \Rightarrow x=\pm\sqrt{y}$

$y=-x^2+2 \Rightarrow x=\pm\sqrt{2-y}$

$$\int_0^1\int_{-\sqrt{y}}^{\sqrt{y}} x+y\,dx\,dy+\int_1^2\int_{-\sqrt{2-y}}^{\sqrt{2-y}} x+y\,dx\,dy \Rightarrow$$

$$\int_0^1\left[\frac{x^2}{2}+yx\right]\Big|_{-\sqrt{y}}^{\sqrt{y}}+\int_1^2\left[\frac{x^2}{2}+yx\right]\Big|_{-\sqrt{2-y}}^{\sqrt{2-y}}dy \Rightarrow$$

$$\int_0^1\left(\frac{y}{2}+y\sqrt{y}\right)-\left(\frac{y}{2}-y\sqrt{y}\right)dy+\int_1^2\left(\frac{\cancel{2-y}}{\cancel{2}}+y.\sqrt{2-y}\right)-\left(\frac{\cancel{2-y}}{\cancel{2}}-y\sqrt{2-y}\right)dy$$

$$\int_0^1 y\sqrt{y}+y\sqrt{y}\,dy+\int_1^2 y\sqrt{2-y}+y\sqrt{2-y}\,dy \Rightarrow \int_0^1 2y\sqrt{y}\,dy+\int_1^2 2y\sqrt{2-y}\,dy$$

$$\int_0^1 2y.y^{\frac{1}{2}}\,dy+2\int_1^0 -(-u+2)\sqrt{y}\,du \quad \boxed{u=2-y}$$

$$\int_0^1 2y^{\frac{3}{2}}dy+2\left(-\int_0^1 -(-u+2)\sqrt{u}\,du\right) \Rightarrow$$

$$\frac{4}{5}.1-\left(\frac{4}{5}.0\right)+2\left(-\int_0^1 -u^{\frac{3}{2}}+\int_0^1 2\sqrt{u}\right) \quad 2u^{\frac{1}{2}}$$

$$\frac{4}{5}+2\left(-\left[\frac{2}{5}u^{\frac{5}{2}}\right]\Big|_0^1+\left[2.\frac{2}{3}u^{\frac{3}{2}}\right]\Big|_0^1\right.$$

$$\frac{4}{5}+2\left(\frac{-2}{5}-0+\frac{4}{3}-0\right) \Rightarrow \frac{4}{5}+2\left(\frac{2}{5}+\frac{4}{3}\right) \Rightarrow \frac{4}{5}+2\left(\frac{11}{15}\right) \Rightarrow \frac{4}{5}+\frac{28}{15}$$

$$\frac{12+28}{15} \Rightarrow \frac{40}{15}=\frac{8}{3}$$