João Felippe Trurler Rondon da Fonseca / Q. 1

$S = \frac{(k)(k+1)}{2}$ é veja que se k for impar k+1 é par e se k+1 for impar k é par

Logo sempre teremos um numero impar multiplicando, o que implicara em um fator primo de S $\neq 2$ já que para $k \neq 1$ todo numero impar possui fator primo impar.

João Felippe Trurler Rondon da Fonseca / Q. 3

$$\sum_{n=1}^{2015} n(n+1-w)(n+1-w^2) = \sum_{n=1}^{2015} n\left((n+1)^2 - (n+1)(\underbrace{w+w^2}_{-1}) - 1\right)$$

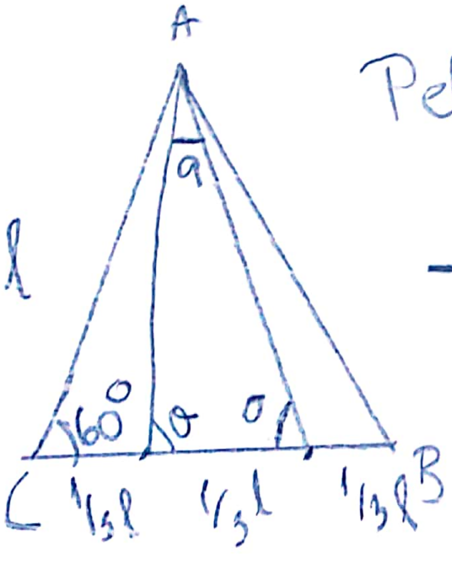
$$\sum_{n=1}^{2015} n\left[(n+1)^2 + n\right] = \sum_{n=1}^{2015} n^3 + 3n^2 + n$$

$$S = \frac{n(n+1)}{2} + \frac{3(n+1)(n(2n+1)}{6} + \left(\frac{n\cdot(n+1)}{2}\right)^2$$

$$S = 2015 \cdot \frac{2016}{2} + \frac{1}{2}(2016)\cdot 2015 \cdot 3031 + (2015 \cdot 1008)^2$$

João Felippe Thurler Rondon da Fonseca | Q. 4

$D\hat{A}E$



Pela relação de Stewart:

$$-\frac{x^2}{2/3\,l \cdot 1/3\,l} = 1 - \frac{l^2}{l \cdot 1/3\,l} - \frac{l^2}{l \cdot 2/3\,l}$$

$$\frac{x^2}{2/9\,l^2} = 1 - 3 - 3/2 \Rightarrow x^2 = \frac{7}{9} l^2$$

$$x = \frac{\sqrt{7}}{3} l$$

$$\frac{\text{sen } 60°}{\sqrt{7}/3\, l} = \frac{\text{sen}\,\theta}{l} \Rightarrow \text{sen}\,\theta = \frac{3\sqrt{3}}{2\sqrt{7}} \text{ //}$$

$$\frac{\text{sen}\,\theta}{\sqrt{7}/3\, l} = \frac{\text{sen}\, a}{1/3\, l} \Rightarrow \frac{\frac{3\sqrt{3} \cdot 1/3}{2\sqrt{7}}}{\sqrt{7}/3} = \text{sen}\, a = \frac{3\sqrt{3}}{2} \text{ //}$$

João Felippe Thurler Rondon da Fonseca/Questão 6

$$f(0)=1\ ;\ xf(-x)=1-f(x) \overset{x\neq 0}{\Longleftrightarrow} f(-x)=\frac{1-f(x)}{x}$$

$$xf(x)=1-f(-x) \Rightarrow f(-x)=1-xf(x)$$

$$\frac{1-f(x)}{x}=1-xf(x) \Rightarrow x-x^2f(x)=1-f(x)$$

$$x-1=f(x)\left[x^2-1\right] \Rightarrow f(x)=1/_{x+1}\ //$$

$f(0)=1/_1$ ✓ ; Logo $f(x)=1/_{x+1}$ Para qualquer x Real.

João Felippe Thurler Rondonda Fonseca / Q F

$P(x) = (x^2 + 2x - 1)(x^2 + x - 1)$

Achando as raízes: $\dfrac{-2 \pm \sqrt{8}}{2} = -1 \pm \sqrt{2}$

e $\dfrac{-1 \pm \sqrt{5}}{2}$ $\sqrt{5} \cong 2{,}2$; $\sqrt{2} \cong 1{,}4$

$-1 + 1{,}4 < \dfrac{2{,}2 - 1}{2}$ $\Rightarrow -1 - \sqrt{2} < \dfrac{-1 - \sqrt{5}}{2} < -1 + \sqrt{2}$

$-1 - 1{,}4 < \dfrac{-2{,}2 - 1}{2}$ $< \dfrac{-1 + \sqrt{5}}{2}$

$b^2 + c^2 = (a+b)^2 - 2ab = 4 - 2(-1) = 6$

$S = 4 \cdot 6 + (a+1)^4 + (d+1)^6 = \left(\dfrac{1 - \sqrt{5}}{2}\right)^4 + \left(\dfrac{1 + \sqrt{5}}{2}\right)^6 + 24$

$1/\ - 1/\ \cdot 4 \cdot \sqrt{5} + 1/\ \cdot 6 \cdot 5 - \dfrac{4}{\ } \cdot \sqrt{5}\,5 + 25$

Digitalizado com CamScanner

João Felippe Thurler Rondon da Fonseca / Q.8

R: $ax+b=y$; $x_0 = -b/a$ e $y=b$

$b - b/a = 3a$; $3a+b=-2$; $b=-2-3a$

$-2-3a + \frac{2+3a}{a} = 3a$; $3a^2 = 3a+2-2a-3a^2$

$6a^2 - a - 2 = 0$; Como $b=-2-3a$

Para cada coef angular Teremos 1 reta apenas

Logo a Soma dos coef angulares é:

$a_1 + a_2 = 1/6$ //

João Felippe Thurler Rondondo Fonseca / Q. 9

$\log a + \log z + \cancel{r} = \cancel{r} + \log y + \log c$

$\log b + \log y + q = \log x + \log c + r = \log z + q + r$

$q - r = \log x + \log c - \log b - \log y$

$r = \log b + \log y - \log z, \ q = \log x + \log c - \log z$

$\log x + \log y + \log z = \log x + \underbrace{\log c}_{} - \log z + \log b + \underbrace{\log y}_{}$

$\log a + \cancel{\log} z$

$yz = ab$

$\cancel{\log x} + \cancel{\log y} = -2\log z + \cancel{\log y} + \cancel{\log x} + \log c + \log b$

$$\log z = \frac{\log c + \log b}{2}$$

João Felippe Thurler Rondon da Fonseca. / Q. 10

$$w^k = \cos\left(\frac{2k\pi}{n}\right) + i\,\mathrm{sen}\left(\frac{2k\pi}{n}\right)$$

$$w^{-k} = \cos\left(\frac{-2k\pi}{n}\right) + i\,\mathrm{sen}\left(\frac{-2k\pi}{n}\right)$$

$$w^k + w^{-k} = 2\cos\left(\frac{2k\pi}{n}\right) \Rightarrow \cos\left(\frac{2k\pi}{n}\right) = \frac{w^k + w^{-k}}{2}$$

B) $Z = 1$ $\quad \sqrt[n]{Z} = \mathrm{cis}\left(\frac{2k\pi}{n}\right)$; Para $k = 1$ até n

Como: $Z^n - 1 = 0 \Rightarrow (Z-1)(1 + X_1 + X_2 + X_3 \cdots X_{n-1})$

Queremos: $X_1 + X_2 + X_3 \ldots X_{n-1} = -1$; como os cossenos são sempre a Parte real: $\sum_{k=1}^{n-1} \cos\left(\frac{2k\pi}{n}\right) = -1$

C) $\cos^4\theta = \cos^2\theta \cdot \cos^2\theta = \left(\frac{\cos 2\theta + 1}{2}\right)\left(\frac{\cos 2\theta + 1}{2}\right)$

$= \frac{1}{4}\left(\cos 2\theta^2 + 2\cos 2\theta + 1\right)$

$$(\cos 2\theta)^2 = \frac{\cos 4\theta + 1}{2} \Rightarrow \cos^4\theta = \frac{\cos 4\theta}{8} + \frac{1\cos 2\theta}{2} + \frac{3}{8}$$

$$S = \sum_{k=1}^{n-1} \frac{\cos\left(\frac{4k\pi}{2n+1}\right)}{8} + \sum_{k=1}^{n-1} \frac{\cos\left(\frac{2k\pi}{2n+1}\right)}{2} + \sum_{k=1}^{n} 3/8$$

Caímos na mesma situação do item B

$$S = -1/8 - 1/2 + \frac{3}{8} \cdot n = \frac{3}{8}n - \frac{5}{8}$$