Lista de Matemática Discreta

1. Use a indução matemática para provar que as proposições dadas são verdadeiras para todo inteiro positivo n.

a) 2 + 6 +10 + … + (4n − 2) = 2n2

b) 2 + 4 + 6 + … + 2n = n (n+1)

c) 1 + 5 + 9 + … + (4n-3) = n (2n-1)

d) $1+3+6+\cdots+\frac{n(n+1)}{2}=\frac{n(n+1)(n+2)}{6}$

e) 4 + 10 + 16 + … + (6n − 2) = n(3n + 1)

f) $5+10+15+\cdots+\frac{5n=5n(n+1)}{2}$

g) $1^2+2^2+\cdots+\frac{n^2=n(n+1)(2n+1)}{6}$

h) $1^3+2^3+\cdots+\frac{n^3=n^2(n+1)^2}{4}$

i) $1^2+3^2+\cdots+\frac{(2n-1)^2=n(2n-1)(2n+1)}{3}$

j) $1^4+2^4+\cdots+\frac{n^4=n(n+1)(2n+1)(3n^2+3n-1)}{30}$

k) $1.3+2.4+3.5+\cdots+\frac{n(n+2)=n(n+1)(2n+7)}{6}$

l) $1+a+a^2+\cdots+\frac{a^n-1=a^n-1}{a-1}$

m) $1.2+2.3+3.4+\cdots+\frac{1n(n+1)=nn+1}{}$

n) $1.3+3.5+5.7+\cdots+\frac{1(2n-1)(2n+1)=n2n+1}{}$

o) $1^2-2^2+3^2-4^2+\cdots+\frac{(-1)^{n+1}(n)^2=(-1)^{n+1}(n)(n+1)}{2}$

p) $2+6+18+\cdots+\frac{2.3^n-1=3^n-1}{}$

q) $2^2+4^2+\cdots+\frac{(2n)^2=2n(n+1)(2n+1)}{3}$

r) $1.2^1+2.2^2+3.2^3\ldots+\frac{n.2^n=(n-1).2^{n+1}+2}{}$

s) $1.2+2.3+3.4+\cdots+\frac{n(n+1)=n(n+1)(n+2)}{3}$

t) $1.2.3+2.3.4+\cdots+\frac{n(n+1)(n+2)=n(n+1)(n+2)(n+3)}{4}$

u) $1.4+4.7+7.10+\cdots+\frac{1(3n-2)(3n+1)=n3n+1}{}$