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CSCI 2824

Problem set 2

Problem 1.

Show that F(2n) = F(n) \* L(n) for n >=1.

F(2(n+1)) = F(n+1) \* L(n+1) -> F(2n+2) = F(n+1) \* L(n+1).

F(2n+2) = F(n) + F(n-1) \* L(n)+ L(n-1) -> foil

F(2n+2) = F(n)L(n) + F(n)L(n-1) + F(n-1)L(n) + F(n-1)L(n-1) ->

F(2n+2) = F(2n) + (F(n-1)+F(n-2))L(n-1) + (F(n)-F(n-2))L(n) + F(2n-2) ->

F(2n+2) = F(2n) + F(2n-2) + F(n-2)(L(n-1)-L(n)) + F(2n-2) ->

F(2n+2) = 2F(2n) + F(2n-2) + F(2n-2) – F(2n-4) -> -4 and -2 to get -3 and + -2 to get -1

F(2n+2) = 2F(2n) + F(2n-1) -> add 2n and 2n-1 to get 2n+1

F(2n+2) = F(2n) + F(2n+1) -> add 2n and 2n+1 to get 2n+2

F(2n+2) = F(2n+2)

Problem 2

N mod 3, 0

N mod 5, 4

3(2)+5(-1)=1 -> 3(2)4+5(-1)0 = 24 -> 5x3=15 so 24 mod 15=9 ->

N mod 15, 9

N mod 7, 5

15(1)+7(-2)=1 -> 15(1)5+7(-2)9=-51 -> 7x15=105 so -51 mod 105 = 54

Problem 3

We sum the exponents used to create the number and then multiply them by two to get all the divisors, (ei+1)

Problem 4

A). x’(x+y)+(y+x)(x+y’) -> x’x + x’y + yx + yy’ + xx + xy’ -> yx + x -> (y+x)

xyz + xy’z + x’yz + x’yz’ + x’y’z’ + x’y’z -> xy’z + x’yz + x’yz’ + x’y’z -> (z+x’)

xyz + xy’z’ +xy’z + x’yz + x’yz’ + x’y’z -> zxy’ + x’yz -> z + xy’ + x’y

B). Student = 37, Car = 20, Bike = 12, Bus = 16

2

4

6

5

People who use some form of transportation = 4+2+6+5+5+5 = 27 venn total in our universe.

Total – people who use some sort of identified transport -> 37-27=10. 10 people use a different form of transport than the types we have identified.

There are 10 student who always use some other type of transportation.

Problem 5

Divisors, 3 has 1, 4 has 1, 5 has 2, 6 has 1, 7 has 3, 8 has 2.

This results in the euler totient

ɸ(3) = 2, ɸ(4) = 2, ɸ(5) = 4, ɸ(6) = 2, ɸ(7) = 6, ɸ(8) = 4

from a point we can trace two ways and repeat the same polygon so in our solution we must divide by two to eliminate repetitions. This is like the handshake question asked in class.

(Eulers totient [n])/2