31/479 Crop VIL 121000 Nama: Machammad Daniyal Kautsar 1 10 . 1 NIM: 21/477067/7k452800 11 14 HWOI waves and acoustics. Problem 1 1), (4.1) and Delantie A, sin (16 (x- 1x/2) - wt + 0.) Pa(x,t) = Ansing k (x+axya) + ut + Da)-11 10 nodes A suppose that A. A. A. DA/2 and A. : Aa + DA/2. Determine 0 × min and 0x max. Assume that 0 = 0 = 0! * Let- A. = Ao - DA/2 00 000 = (1) (0) A2 = A+ +QA/2 2 - 10 = 0 = 0 Adding two wave equation give D(xit) = D, (xit) + O(xit) -= A, Sin (K (x=0x/2), - w++ Q.) + Az sin (+(x+0x/2) - wt + or) m man x = [A+ -) A /2) sin (Kx - KDx - wt) + (A+ DA/2) sin (Kx + kox - wt) ... 3 - A to a lot okox is mi and Kx-wr = 1. mil segul 8 parents down works with ones as lot D(x+) = (A0-DA/2) sin (n-m) + (A0+ DA/2) sin (n+m) + = Ao(sin (n-m) + sin (n+m)) + (DA/2 (-sin (n-m) + sin (n+m)) -940 SA 0 (++) =2A & (Jin(n) cortm))+ OA (cor(n) sin(m)) bet we can let 2 Ao cos (-m) = A cos & of the state of th now, we can calculate the combined A uring A = VA'cor'd + A'sin'd SISO - AS AS AS CON P + A : MOSIN'S

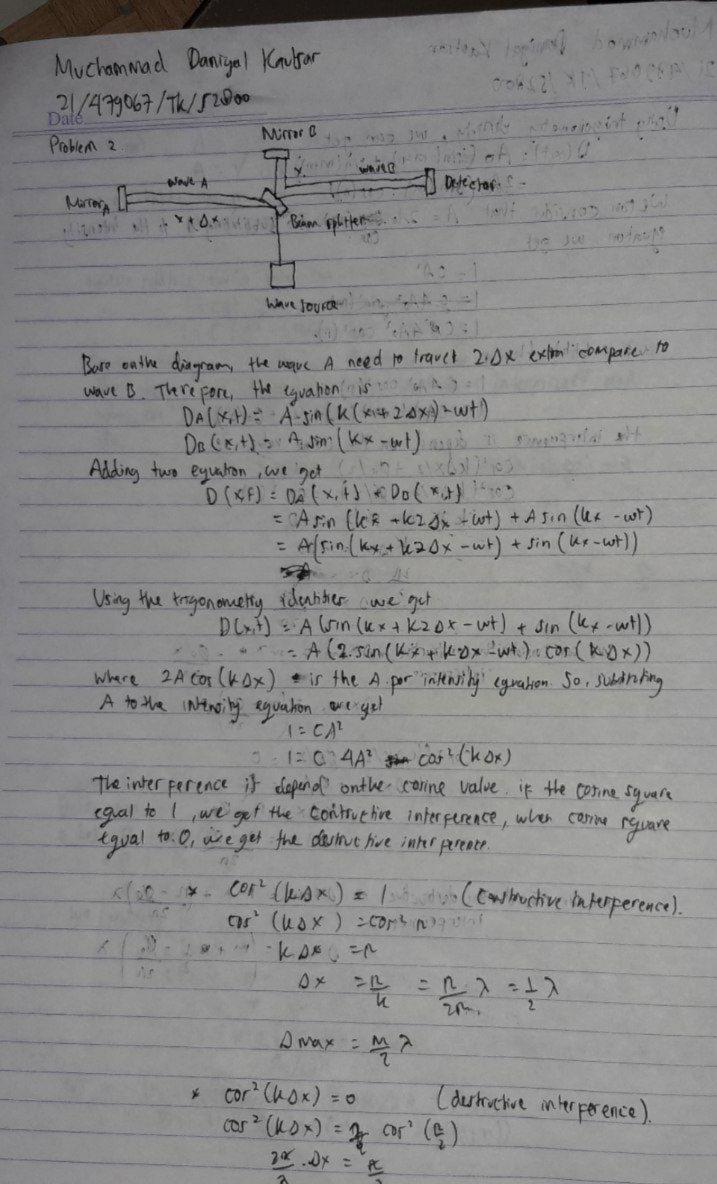
(1 + 4) m: A=V4A6 (0) + OA" (m) + OA" (m)

Using trigonomotry identity sin + cor = = 1.

Nuchammad Danier | Kauffor 21/479 067 /The 152000 we get . A = VA/o' cor'(m) + DA'(1-(ar(m))). A = V OA' + (4A' - OA') COP'(m) 15 11 12 11 11 A = V DA3 + (4A03 - DA2) CO12 (KEX) nowwe fall be the A into the 1 = EAT Thebere Lif complant control. 1= (A2 + (AA2 - DA2) COP(KOX)) Because the equation of the wave depends on aside value, we can determine that when "cos" (NOX) = 1 is constructive la hiperened and when tor? (le DX) = & it dertue tive interperince 30 continued to the contin ((k dx) = to (() (()) () ((k dx.) = x or ()) Kox = On O + Kox - D 20 0x - 1 - 1 - 20 0x - 74 X DX = X I I I I I I I I Dxmx = m x/0 + /10 | Ox = 2 Strong culture of the strong of the strong or sould. to colculate a percent of 2 dirinace =(m+1)% B suppose that 101 = - Bo/2 and De = 80/2. Assume that A = A2 = A0. Determine the Dx min and Dx max ! * Let 0, = -0./2 - 12 + 11-11 st (004-1) 11-11 The same for See Sole is a fine thing to an all sales A .: Az = A. we asiding two worse expension of the manufact of the D(x1)= D((x,1) + D((x,1))
D(x1)= D(x1)+ D((x+2x/2)-16++0)) + Azbin(k(*x+0x/2)) 19 10 4 - w+ + D2)) ... C +11 ... C +1 = = A = (sin (kx + kox/2 - w) + - go/2) + sin (kx + kox/2 - w) + Do/2) Webster may not were let m: k+ - who and n: k0x/24 + 90/2 -D (x, +) = Ao (sm (m+n) + sin (m+n)) the state of the property of the state of th

Mochemered Danigal Kaufrar THE THEORY AND ASSESSMENT 21/439067/JK/52800 Using trigonometry diritity, we can get O(xit): Ao (rial m-n) + 1 in (m+n)) = 2 Ao (Tin [m) . tos (n)) We can consider that A = 2.4. com (on). So substituting A to the litersity muston, we get 1 = CA' 1-64/2 sin' (m) 1: CA 4A0' COS' (0). I we subtible the in the and a begin to age of come of which will I = CAAD cor (n) when I was start I want 1 = CAN CON (KOX/2 + 00/2) the interference is depend on the custom values of cor (KOX/2 +00/2) = + my records out sublice Con 2 (K D x / 2 0 + DE / 2) = Cor 2 (0) (to ad) 1 2 4 10 k DE/20 4 dels = 0 -Howard and the contract of FT . DX - -00 the true the experience of any we can consider the constructive + DX place - m7 . - 00 x Dxm. = (m= 00) A1 01 0 4 THE CONT (KDX/1 + po/2) = 0 more much see at solar grote Dylant Dela : D tomorag mont out The model and the transport that sale of the Ox on the Ton of the trans many and sit a mile x = a - do ox louis (over for possible the destructive to axonin = mx + (n - 00) x Interpretation (X & H) (XX 0 Aman = (m + 1 - 10) x Flak Ma Da y EM - MANG 0 = (4,4) 103 3 Bans to Melan Blag areas in (p) (a) p = (x 0 x) (w) A -11 - 1.00 - 1 - 0 -

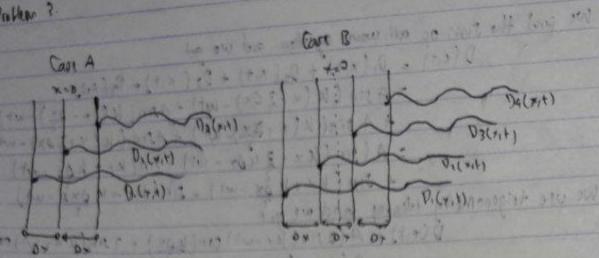
COURT



0x = 2 -0 0xmin = mx + 2

(KKY)

Problem ?



Assume that all unies have the same amplifude and preguency.

the arm on the actions of be all are the sing Determine the Amplitude (A(axt) and intensity ((Ox) = (A(Ax))) the longs bent (xa) F. top 100 to of the rarelling wave.

lux find the sum of all three wave equations we get in D(x,x) = D,(x,t) + D,(x,t) + D,(x,t) 11 30,000

= Asin (K(x+0x) - w+ 1+1Asin (Kx-w+) + Asin (K(x+0x)) - 44 m. f(tw. = 1 646

setiment to make the senter

20 (10 + 30 CE + 17 (22 800)

8 1400

Using trigonometry identifier weget and a solve

D (+it) = A (sin (k+ - kox - wt) + sin (k+-wt) + sin (k++ kox -wet) to a series (11) 1 go domo to 30

=A (2 sin (Kx wit) cos (Kox) + sin (Kx+wt)) = A (sin (4+ - wt)) (2005 (NOX) +1)

eve can simply fiel the "O(xit):

D(+,+) = A(sin(ux-w+)+(2cor(uDx)+1)

o = A(Ox) . Jin (ky-wt) . co

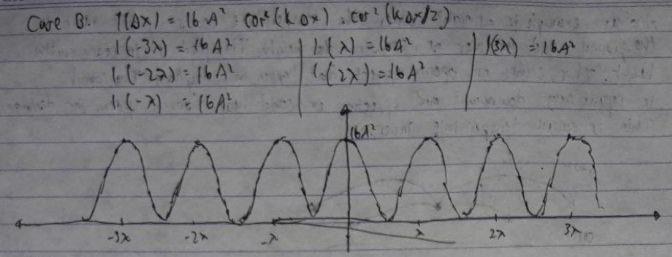
From that, we get the A (DX) that egual to A (Dx)= 200 A (2 (05 (k Dx)+1)

where k = 2R.

To find the intensity, we sublishe A(DX) to the I(DX)= |A(DX)2 |. we get -1 (0x): 1 ((A(200r(h0x)+1))) 1 (Dx) = A2 (2 (or (UDx)+1)2 where k is also in/2.

restoral formal beautiful Mudrammad Danigal Kautar Date 21/479067/TK/52800 twe B. we find the sum of all wave equition and we get D(x,t) = , D, (x,t) + D2(x,t) + D3 (x,t) + Pq(x,t) = Asin (k(x-30x)-wt) + Asin (k(+-0x)-wt) + A sin(k(++ Dx)-w+) + Asin(k(x+30x)-w+) = A (3111 (kx - 3 kox - wt) + 3111 (k+ + kox - wt) + SHO (Kx + 12 0x - w1) + Sin (Kx + K 0x2 - wt) D(+,t) = A(2 sin(kx-wt) cor(kox) + zsin(kx-wt) cor(zkxx) We use trigonometry identity and we get = A (25in (Kx-wt) (cor (KOX/2) + cor (3KOX/2)) we can simplified the equation and we can get D (with A (ox). sex Ain (kx wit) And, we get Alox) that equal to some many and the A(DX) = 4A cor(KDX). cor(KDX/2) A 140 where he made and some south the to met out any series Also, we can subtitute Alax) to the Intensity Equation I (ax) = |A(0x)2|) 42 A (() = (A ())] 1 A = (4A.001(kox). (05 (Lox/2))2 (16 A2) cor (kox) - cor (kox) - cor (kox/2) where k is also k = 20 go with the whole who were a could restration (to estant the se extent to feel a B. Plot a graph of I(Ox) for -32 & Dx 6 32! Core A . 1 (Ax) = A2 (2 cor (Kox) +1)2 1(-1,5) =0 1(2,5%) 20 -1 (-3 x) = 942 11 (x) =942 1(-27) = 9A2 1 (-0'2 y) =0 1 (2) = 9412 1 (-1) = 9/1 1 /1 (3x) = 941 11(0,5 x)=0 1(157)=0 1(0) (19A) (1(=25/2)==0 of the took (+1) + off top out for most 1 A GAL (> 4) 6 YORK WINES

Muchannovad Dannyal Kaubar Date 147067 / The 152800



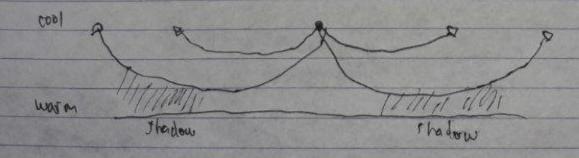
Problem 4

KY)

Ashdust liver around 2.5 km: From the closest thilroad track. Evethough the truck is quite par, he can still hear, the sound of a train in the evening their wondering why this kind of phenomenon happens because he never hear the train round from his house in the morning or afternoon.

A Please explain to him the reason only can this trap and as phrenomenon happen?

this phenomenon is due to the refraction of the sound wave. Wave speed changes gradually over a given distance. The speed of a sound conve in our depends on the temperature (c. 331 + 0.67) where Tist tomp ic it. Open, it swelting repracts on for example, during the day, the air is automast right next to the ground and grows cooler above the grand. This is called temperature lapse since the temperature decrease with height, the speed of sound is also durease. This mean when the sound is traveling close to the ground, the part of the wave close to the ground is traveling the pastert, and the part purtest above the ground is slowest its the result the consecution of the first power than the sound wave current penetrate. A person slowding in the day come that the sound wave current penetrate. A person slowding in the day come.



Muchaminad Doniyal Kaubar 21/479 67/TK/52800

Another example is at night either the temperature coolest pight next to the ground and warpier or increasing the height. The speed is increase with height. Thus, create an operate effect. That happen in day have The sound is regrationed downward and effecting or could hear around prom for distance.

Salary James C. Savare 19419

This is called temperature inversion.

Only the property of th

B. Con other same expensions be applied to explain an optical phenonionals.

callect falls Morgono & Phare explain your neares! 10.7

Ter, the reproction of sound and light happen in same principle.

When the light time!, light depends on the temperature Higher the soot temperature crease less donne their optic and viceversa. The density of the optic appearance experting the two reproction index of light.

control of the contro

works 12 months of the same