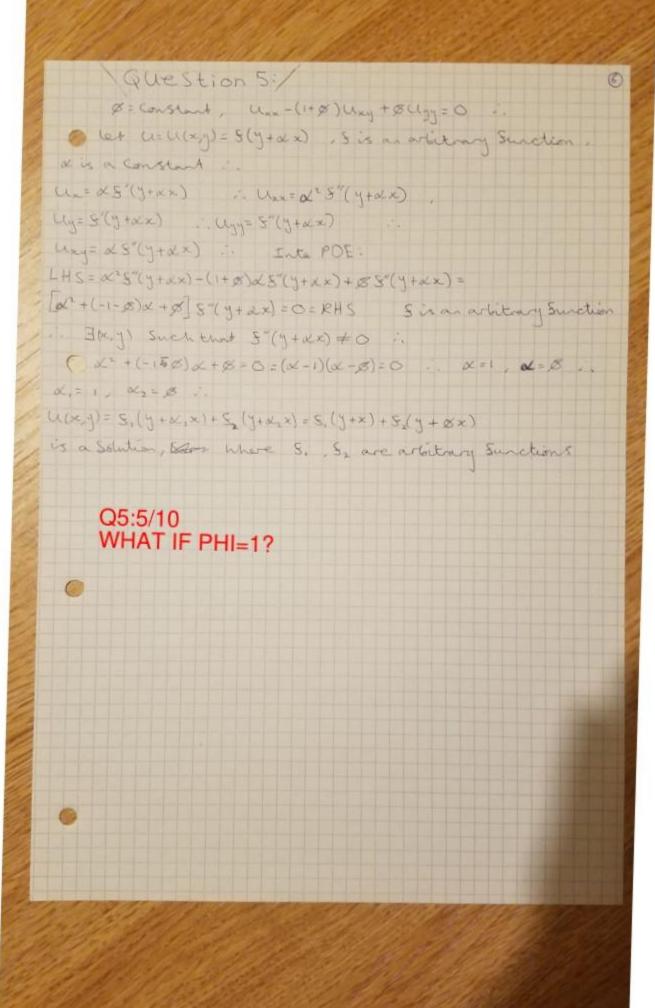


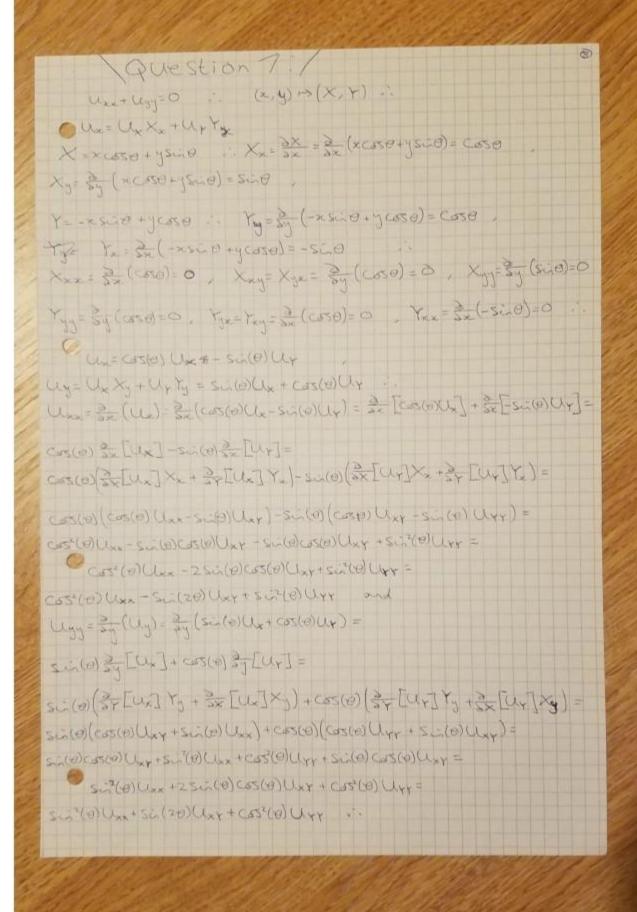
|Question 26:/ (1(x,y) = S(ye-arcten(x)), where S is an arbitrary Sunction From boundary Condition (1/x,0)=(1/x,1=0)= 5 (10)e-arctan(x)) = 5 (0)= Lnx But the Sunction & Counst have olisserent values (lax) for one and the same value of the argument (0) Because the Sunction Carnot have disserent outputs (Multipleoutputs) for the Same input. So this result Carnot be Satis sied. Because the boundary Condition is set on y=0 which is a Chracteristic Curve because g(x)=0 is a special Solution. So the Solution to the Boundary Condition does 12 exist Q2:10/10

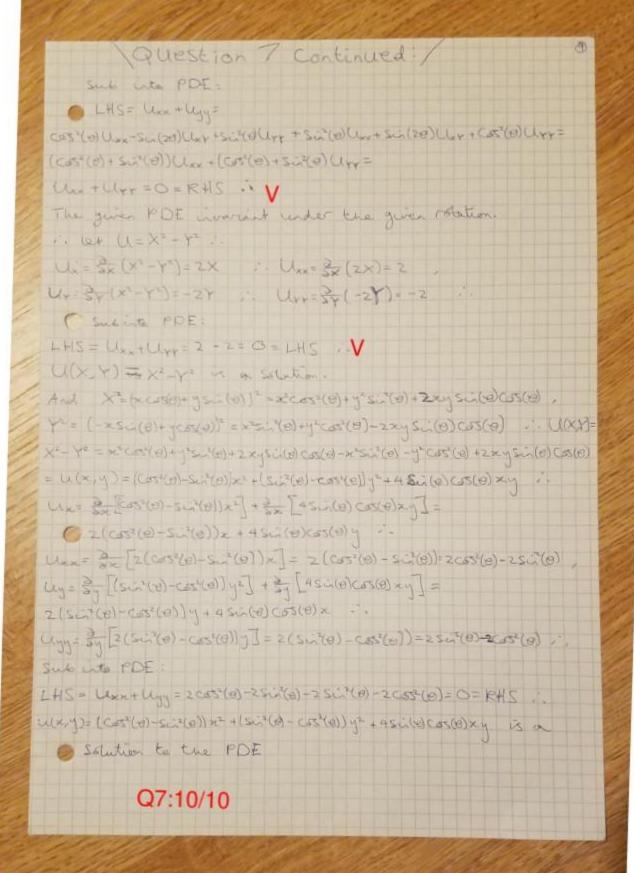
Question 3:/ 3x +x2y 31 =0 = Ux+x2y Uy=0 ... @ (1,x2y).(Ux, Uy)=0=(1,x2y). TU 1. (dx, dy) | (1, x2y) so (dx, dy) is parallel to (1, x2y) i. (1=(1(x,y)=constant along (1,xxy): 1 = x2 y ... · dy = x2 ... 好 y(x)=0 is a special Solutionio Signite de = Stade = Signaly = (n/y) = = = x3 + C, where Cisan arbitrary Construk 1 y = etx +c ... y = te = x3+c ... Chameteristic curves is: y= Aetx3. Where A is an arbitrary Constant. ...
A=ye=xx3... Green | Solution is: u=u(x,y)=S(ye=±x2). where S is an arbotromy Sunction: is (1= 3x 5(ye-\$x) = 3x [ye-\$x] 5(ye-\$x] = y 3x [-\$x3]e-\$x3 5(ye-\$x3) = -4x2e-5x35(4e-3x3) ( THZ = 3x +x, 2x = 1x +x, 2nn = - 4x2 e- 3x5 5 (ye- 5x3) + x24e - 3x5 (ye- 2x3) = (-4+4)x2e-\$x35(4e-\$x3)=(0)x2e\$x35(4e-\$x3)=0=RHS as required (1(x,y) = S(ye + x2) is Overent Solution. Q3:10/10

Question 4./ 112-26/4-12-e5x : (e+ a=1, b=-2, c=1 , g(x,g)=e5x aux+buy+cu=g(x,y) .. let == ax+by . 1= bx-ay Lu= Uz3 + Uy 2 = aug+ blig cy=lig5, -lly/2= bllg-ally . Into PDE a(aug+buy)+b(bug-aug)+cu=g(x,y)=g(g(x,y), 2(x,y))=q(g,2)= ally +ablig+6'lig-ablig +Cli = (a'+5) lig+Cli = j(5,2)=g(x,j) : Ug + 2 - ( = 3(5, 2) = + = Ug + = U = = = 3(5,2) Sor at + 1 = k ... 4(5)(15+4(5) = 1=4(5) + J(5,7)=4(5)(15+4(5)(1=3)(45)(1) ( ) h'(5) d5 = [ L(5) = L(1(5)) = [ 5] . L(5) = [ 5] . L(5) = [ 5] . \$ (e \$ 5 a) = e \$ \$ \$ \$ (\$, 2) ... K=02+6" = 12+(-2)=1+4=5 WHIX WENDER + = Jet = = 7(4,2)35 ax+by= == x+2y , 6x-xy=7=2x-y ... 9 = Ay : -68-02 = 68-07 = -28-7 = -38-52 9(x, y)=e5x = e5(\$\$-\$1)=e5-21 = 9(5,2)=e5-27 U(3.5)=e-\$\$ (e\$\$ \$ e\$e-17 >5 = \$e-\$\$e-17 \e\$\$ >5 = +e- \$5e-27 ( fefs +g(2)) = \$e-\$ 1e-28 (2) +6e 5e-27 = 食をessf(1)+tes=21=い(5,7)= e-\$(x-2)) F(-2x-y) + = e5x = U(x,y) = e-\$x+\$ J F(-2x-y)+ = e5x where I and F are arbitrary Eurotions Q4:10/10

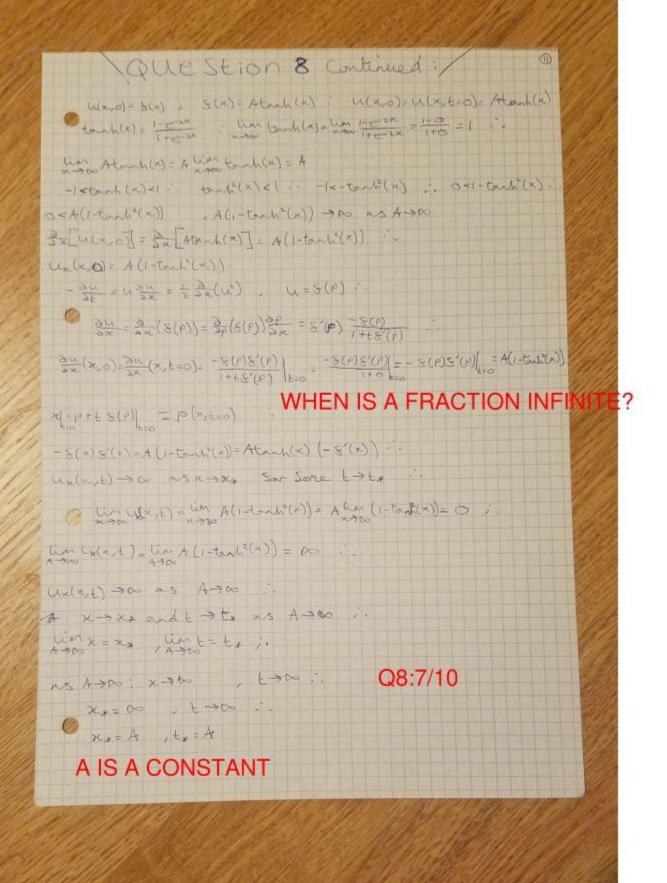


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Question 6./
                5x2 lex-y'lly+5xlex-ylly=0 .. use charge os minkes.
            x=et , y=es : (x,y) ↔ (t,s) .. t=(xx , s=(xy):
    uz=lletx= tu :.
   Un = 3 ( to u) = 3 ( to ) ue + 3 ( (u) to = - to u + 3 ( (u) to = - to u + 1 3 ( (u) )
   - x U6 + x 3 (U6) 36 = - x U6 + x U66 x = x U66 - x U6
  Un= Us Sy = 4 Us
   ひかきき(ナル)=まりは)いの+まり(いの)す=-ないのす=かいのす=かいかますまり
   - july + j 35 (Us) 35 = - july + juss j = july = july i. Into PDE:
              LHS=5x1(=101-311)-y1(+1015-411)+5x(+101)-y(+101)=
   Sun-Sun-Uss +Us + SUn-Us= SUn-Us= = 0= RHS
   let U=5(t+xs), were 5 is an arbitrary Sunction, of is Constant
  (4=5"(+ xs) : (41=5"(+ xs)
  Us: 25'(t+25) .. Uss = 2'5"(t+25) .. Into equation
   LHS = SULL - USS = S5"(E+25)-2"5"(E+25)=(5-2")5"(E+25)=0=RHS
 5.5(t,5) , 5 is an arbitrary Suretion i. I(t,5) Suchthat 5 # Oi.
  3(ts) suchtrut 5"(t+ds) ≠0
           5-22=0 . 5=2 . : : 15=2
 d,=+15 , x=-15
 let 3= 6+06, 5= 6+155 , 2=6+06, 5 = 6-155
 for arbitrary surctions to hard go to hand q:
4= 5 (ENTSS)+ 1(E-15SS)= h(E)+1(E)=
h((nx)+15' (n/y))+ q((nx)-15 (n/y))=
h(ln(x)+ln(y5))+q(ln(x)-ln(y5)=
                b(la(y) x))+ q(-la(y) (x))=
           F(y15x) + C+(y15/x) = U(x,y) = F((y15x)15) + C+((y15/x)15) =
$\ \( \( \frac{1}{5} \times \frac{1}{5} \right) + \( \frac{1}{5} \frac{1}{2} \
arbitrary Sunctions
                                                                                 Q6:10/10
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Question 8 / S = S(P) .  $\frac{58}{5P} = \frac{58(P)}{5P} = \frac{48(P)}{4P} = S(P)$ Depts(r)  $\frac{\partial K}{\partial x} = \frac{\partial}{\partial x} \left( F + t \cdot S(F) \right) = \frac{\partial F}{\partial x} + \frac{\partial}{\partial x} \left( t \cdot S(F) \right) = 1 = \frac{\partial F}{\partial x} + S(F) \frac{\partial L}{\partial x} + t \frac{\partial}{\partial x} \cdot S(F) = 1$ 3+ + (0) S(P) + + 3 [S(P)] 3+ = 3+ ++ 5(P) 3P = 1 = (1++5(P)) 3+ . 30 1+65(P) M1 3 (x)= 3+ (P++8(M)) = 0 = 3+ +3+ (+5(F))= 3+ +8(P)3+ +E3+8(P)= 30 + 8(P) + 6 3 [ 5(P)] 30 = 30 + 8(P) + 65(P) 30 = (1+65(P)) 30 + 5(P) =0 (1+68(P)  $\frac{3P}{5E} = -8(P)$  .  $\frac{3P}{5E} = \frac{-8(P)}{1+68(P)}$  M1 winces= s(r(x)) : (2= s(r) : CLE = 3 (S(P)) = 3 [S(P)] 3P = S'(P) -4(F) Un= = (8(P)) = = [8(P)] = 8(P) | + ES(P) : Subjects PDE LHS = UL +ULL = 8'(F) + 8(F) + 8(F) 8'(F) + 1+68'(F) = (-1+1) 5'(P)S(P) = 0 = RHS M3 u(xx)=8(P(xx)) satisfies the PDE where let u(x0)=u(x,t=0)=5(P(x,t=0))=5(P(x))=5(x) is the within condition at t=0 3(1×0) = = 5(x)= = (x)= = ((x)) = = [5((x))] = (x) 3 [S(P(x))] 3 P(x,t) = S'(P(x)) - S(P) = - S'(P)S(P) = - S'(x)S(x) 24(40) = 2 5(x) = 8'(x) : . it to Sue into PDE: DLHS=-5'(x)5(x)+5(x)5'(x)=(1-1)5'(x)5(x)=Φ=RHS : the Solution satisfies the initial condition u(x,0)=5(0) M2



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