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INSTFUCTOFFS SOLUTIONS MANUADUT INTRODUCTIO IN ELECTRODYNIMCS Third edition by David J. Griffiths 2. TABLE OF CONTENTS Chapter 1 Vector Analysis Chapter 2 Electrostatics Chapter 3 Special Methods Chapter 4 Electrostatic Fields in Matter Chapter 5 Magnetostatics Chapter 6 Magnetostatic Fields in Matter Chapter 7 Electrodynamics Chapter 8 Laws on the Preservation of Chapter 9 Electromagnet Wave Chapter 10 Potentials and Fields Chapter 11 Radiation Chapter 12 Electroynamics and Relativity 22 42 113 125 146 157 179 195 219 3. Chapter 1 Problem Vector Analysis 1.1 (a) From Chart, IB and CI cos93 BH cos 0; + | Kjos 92. Multiply by A.I. | A B and ERS cos03 A B Bz oos01 A's Kzos92. So: A-(B q C) - A-B and A-C. (The point product is a distribution product.) Similarly: B and C sin 03 - Sin 01 - SIN 92. Multiply by A's ii. IAHB and C sin 03 f1 and LAS Sin BH 01 f1 and LAS 3 F sin 02 f1. If f1 is the unit vector pointing to the page, it follows that AX (B and C) (AXB) (AXC). (Cross-product is distributional.) (b) In general, see H.E. Hay's Vector and Tensor Analysis, Chapter 1, Section 7 (point product) and section 8 (cross product). Problem 1.2 Triple cross-product in general is not associative. For example, let's say that A and C are perpendicular to A, as in a diagram. Then (BCX) points out the page, and AX (BC) points down, and hasmagnitudo ABC. But (AXB) C, or B (AXB) C 0 95 5 Ax (BxC). . BXC iAx (BxC) ANALYSIS Problem 1.3 z'N 'N Cross-product of any two vectors in the plane will give the vector perpendicular to the plane. For example, we can choose the base (A) and the left side (B): A'1)c'2S'0i; Bz-1h-0S'32. AS No1: 'c'1\$ r-1i; A, S, B; B-1fc 1\$12; Bz fi. BBC-1-1-1ABcos9/5/ cos9 zgt.cos0. 0 - cos1 z 70.5288 Problem 1.4 4. I/ HOME VECTOR ANALYSIS L 54 (7 2 Ax'B' 1-1 2 0 61'c'3S'r'22. -1 0 3 It has the right direction, but the wrong value. C, - B, C, , (BCK, -- B, C, ) (B, Sai - B, C, ) - i|A|/ (Bzc' B'3102) - Az (-Bzc' B'zc1) (I'll just check the x-component; others go the same way,, --- qlt;) B (A-C) - C (A'B' - GB, (130, A, C, q/1.0)- (A, B, A, B, , A, B,);>: 'c q ( ) 5' ) 2 q 1'(AyB, C' , A, B, C, - A, B, C,) 370 и 2 ( ). Они согласны. Problem 1.6 Ax (BXC)+Bx(C&gt;&tA)+C&gt;&t(Ax) = b(a-c)-c(a-b)+c(a-b)-a(c-b)+a(b-c)-b(c-a)=0. so: ax(bxc) = (abx)xc= Bx(C&gt;&tA) = a(b-c) = c(a-b) = if: this is= zero, = then= either= a= is= parallel= to= c= (including: the= case= in= which= they= point= in= opposite= directions, = or= one= is= zero), = or= else= b-c=B-A = 0, = in= which= case= b= is= perpendicular= to= a= and= c= (including= the= case= b=0). conclusion:= ax(bxc)=(AXB) xc=&gt;&t(A)A&gt;&t; &t; &t;= &t;&t; either A is parallel to C, or B is perpendicular to A and C. Problem 1.7 Problem 1.8 (a) /11.3, +1.3, = (cos 45A, + sin CA, ) (cos cB, , + sin cB, ) + (--- sin cB, y + cos c&gt;&tB, ) = cos? cA, B, , + sin cCos(A, B, + A, B, , ) + sinz cA, B, + sin' cA, B, , --- sinCosc(A, B, + A, B, , ) + cos' cA, B, = (case 45 + sin c)AyBy + (sin2 :15 41- cos c)A, B, = A, B, , . / (b) (2)? + (y/z + (1)2 = 3^12a'7471 = 331 (53&=1R: 'A: ' ) (E3=1RMAI)= = 331.1: (5-7z'R-'jR')AlC) ME . . 1'' = Is: This equals A: + A: + A3 provided E', '-R, -? , ; , = { U '7 } 0 if ja&ek Moreover, if R is to preserve lengths for all vectors A, to this uo condition= ax(bxc)=(AXB) xc=&gt;&t(A)A&gt;&t; &t; &t;= &t;&t; either A is parallel to C, or B is perpendicular to A and C. 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