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1: ClrHome
2: "CHANGES MADE TO ALLOW PROGRAM TO RUN
3: "  EVEN IN EXTREME CASE OF MISSING BASIC
4: "  LISTS L1, L2, ...
5: SetUpEditor
6: Fix 3
7: Disp "VECTORS3"
8: {0,0,0}→LZ
9: {1,1,1}→LONE
10: If dim(L1)=0
11: LONE→L1
12: If dim(L1)≠3
13: LONE→L1
14: If dim(L2)=0
15: LONE→L2
16: If dim(L2)≠3
17: LONE→L2
18: If dim(L3)=0
19: LONE→L3
20: If dim(L3)≠3
21: LONE→L3
22: If dim(L4)=0
23: LZ→L4
24: If dim(L4)≠3
25: LZ→L4
26: Lbl 5
27: Menu("MENU 1", "ENTER U", 10, "GO TO MENU 2", 20, "ENTER V", 11, "ENTER W", 12,
      "SWAP U AND V", 13, "SWAP U AND W", 14, "SWAP V and W", 15)
28: Lbl 10
29: Input "U= ", L1
30: If sum(L1*L1)=0
31: Then
32: Disp "CANNOT DEAL WITH", "ZERO VECTOR"
33: Goto 10
34: End
35: Goto 5
36: Lbl 11
37: Input "V= ", L2
38: If sum(L2*L2)=0
39: Then
40: Disp "CANNOT DEAL WITH", "ZERO VECTOR"
41: Goto 11
42: End
43: Goto 5
44: Lbl 12
45: Input "W= ", L3
46: If sum(L3*L3)=0
47: Then
48: Disp "CANNOT DEAL WITH", "ZERO VECTOR"
49: Goto 12
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50: End
51: Goto 5
52: Lbl 13
53: L1→L5
54: L2→L1
55: L5→L2
56: Pause "SWAPPED U and V"
57: Goto 5
58: Lbl 14
59: L1→L5
60: L3→L1
61: L5→L3
62: Pause "SWAPPED U and W"
63: Goto 5
64: Lbl 15
65: L2→L5
66: L3→L2
67: L5→L3
68: Pause "SWAPPED V and W"
69: Goto 5
70: Lbl 20
71: Menu("MENU 2", "GO TO MENU 1", 5, "DISPLAY", 21, "GO TO MENU 3", 40, "DOT
    PRODUCTS", 22, "U X V TO L4", 25, "U X W TO L4", 26, "V X W TO L4", 27)
72: Lbl 21
73: Disp "VECTORS..."
74: Disp "U"
75: Pause L1
76: Disp "V"
77: Pause L2
78: Disp "W"
79: Pause L3
80: Disp "LAST CROSS PROD"
81: Pause L4
82: Goto 20
83: Lbl 22
84: L1*L2→L5
85: Disp "DOT PRODUCTS"
86: sum(L5)→D
87: Disp "U·V"
88: Pause D
89: L1*L3→L5
90: Disp "U·W"
91: Pause sum(L5)
92: L2*L3→L5
93: Disp "V·W"
94: Pause sum(L5)
95: Goto 20
96: Lbl 25
97: L1(2)*L2(3)-L1(3)*L2(2)→L4(1)
98: -(L1(1)*L2(3)-L1(3)*L2(1))→L4(2)

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99: L1(1)*L2(2)-L1(2)*L2(1)→L4(3)
100: Disp "U X V ="
101: Disp "I   J   K"
102: Pause L4
103: Goto 20
104: Lbl 26
105: L1(2)*L3(3)-L1(3)*L3(2)→L4(1)
106: -(L1(1)*L3(3)-L1(3)*L3(1))→L4(2)
107: L1(1)*L3(2)-L1(2)*L3(1)→L4(3)
108: Disp "U X W ="
109: Disp "I   J   K"
110: Pause L4
111: Goto 20
112: Lbl 27
113: L2(2)*L3(3)-L2(3)*L3(2)→L4(1)
114: -(L2(1)*L3(3)-L2(3)*L3(1))→L4(2)
115: L2(1)*L3(2)-L2(2)*L3(1)→L4(3)
116: Disp "V X W ="
117: Disp "I   J   K"
118: Pause L4
119: Goto 20
120: Lbl 40
121: Menu("MENU 3", "GO TO MENU 1", 5, "MAGNITUDES", 45, "ANGLES BETWEEN", 50,
"UNITS", 55, "DIRECTIONAL", 60, "PROJECTIONS", 65, "QUIT", 99)
122: Lbl 45
123: √(sum(L1*L1))→A
124: √(sum(L2*L2))→B
125: √(sum(L3*L3))→C
126: Disp "MAGNITUDE U", A
127: Disp "MAGNITUDE V", B
128: Disp "MAGNITUDE W"
129: Pause C
130: Goto 40
131: Lbl 50
132: Radian
133: Disp "IN RADIANS"
134: cos-1(sum(L1*L2)/√(sum(L1*L1)*sum(L2*L2)))→C
135: Disp "ANGLE U AND V", C
136: cos-1(sum(L1*L3)/√(sum(L1*L1)*sum(L3*L3)))→D
137: Disp "ANGLE U AND W", D
138: cos-1(sum(L2*L3)/√(sum(L2*L2)*sum(L3*L3)))→E
139: Disp "ANGLE V AND W"
140: Pause E
141: Goto 40
142: Lbl 55
143: √(sum(L1*L1))→A
144: √(sum(L2*L2))→B
145: √(sum(L3*L3))→C
146: (1/A)*L1→L5
147: Disp "UNIT IN U DIR"

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148: Pause L5
149: (1/B)*L2→L5
150: Disp "UNIT IN V DIR"
151: Pause L5
152: (1/C)*L3→L5
153: Disp "UNIT IN W DIR"
154: Pause L5
155: Goto 40
156: Lbl 60
157: Radian
158:  $\sqrt{\text{sum}(L_1 * L_1)} \rightarrow A$ 
159:  $\sqrt{\text{sum}(L_2 * L_2)} \rightarrow B$ 
160:  $\sqrt{\text{sum}(L_3 * L_3)} \rightarrow C$ 
161:  $\cos^{-1}(L_1 / A) \rightarrow L_5$ 
162: Disp "IN RADIANS"
163: Disp "DIRECTIONAL ANGLES", "FOR U:", "ALPHA, BETA, GAMMA"
164: Pause L5
165:  $\cos^{-1}(L_2 / B) \rightarrow L_5$ 
166: Disp "DIRECTIONAL ANGLES", "FOR V:", "ALPHA, BETA, GAMMA"
167: Pause L5
168:  $\cos^{-1}(L_3 / C) \rightarrow L_5$ 
169: Disp "DIRECTIONAL ANGLES", "FOR W:", "ALPHA, BETA, GAMMA"
170: Pause L5
171: Goto 40
172: Lbl 65
173:  $(\text{sum}(L_1 * L_2) / \text{sum}(L_2 * L_2)) * L_2 \rightarrow L_5$ 
174: Disp "Project U ONTO V"
175: Pause L5
176:  $(\text{sum}(L_1 * L_3) / \text{sum}(L_3 * L_3)) * L_3 \rightarrow L_5$ 
177: Disp "Project U ONTO W"
178: Pause L5
179:  $(\text{sum}(L_2 * L_3) / \text{sum}(L_3 * L_3)) * L_3 \rightarrow L_5$ 
180: Disp "Project V ONTO W"
181: Pause L5
182: Goto 40
183: Lbl 99
184: Float
185: Stop
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