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1: ()
2: Prgm ©Three space vector program for two vectors
3: ClrIO
4: Disp "Three Space Vector Program","For Two Vectors"
5: © Save Mode vaues so that we can restore them later
6: getMode("Angle")→ma
7: getMode("Display Digits")→mdd
8: getMode("Exact/Approx")→mea
9: © Set the mode values for the program
10: setMode("Display Digits","Fix 4")
11: setMode("Exact/Approx","Approximate")
12: setMode("Angle","RADIAN")
13: © do a little preliminary work to be sure that the vectors are OK
14: {0,0,0}→l1
15: If getType(l1)="NONE" Then
16:   l1→l1
17: Else
18:   If getType(l1)="LIST" Then
19:     If dim(l1)=3 Then
20:       Disp "L1 exists as ",l1
21:     Else
22:       Disp "L1 was ",l1," changed to "
23:       l1→l1
24:       Disp l1
25:     EndIf
26:   Else
27:     Disp "L1 existed as wrong type"
28:     Disp "Saved as L1old and reset"
29:     l1→l1old
30:     l1→l1
31:     Disp "L1 now",l1
32:   EndIf
33: EndIf
34: If getType(l2)="NONE" Then
35:   l2→l2
36: Else
37:   If getType(l2)="LIST" Then
38:     If dim(l2)=3 Then
39:       Disp "L2 exists as ",l2
40:     Else
41:       Disp "L2 was ",l2," changed to "
42:       l2→l2
43:       Disp l2
44:     EndIf
45:   Else
46:     Disp "L2 existed as wrong type"
47:     Disp "Saved as L2old and reset"
48:     l2→l2old
49:     l2→l2
50:     Disp "L2 now",l2
51:   EndIf
52: EndIf
53: © Set up menu system

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54: Lbl lmain
55: Toolbar
56:   Title "Enter L1",lent11
57:   Title "Enter L2",lent12
58:   Title "L1 dot L2",l1d12
59:   Title "L1 X L2",l1x12
60:   Title "Page 2",lmore2
61: EndTBar
62: Lbl lmore2
63: Toolbar
64:   Title "Swap",lswap
65:   Title "Display",ldisp
66:   Title "Magntude",lmgntd
67:   Title "Angle",langle
68:   Title "Page 3",lmore3
69: EndTBar
70: Lbl lmore3
71: Toolbar
72:   Title "Unit",lunit
73:   Title "Directional",ldrct
74:   Title "Project",lproj
75:   Title "Page 1",lmain
76:   Title "Quit",lquit
77: EndTBar
78: Lbl lent11
79: Disp "Enter L1 as a list {...}"
80: Input "L1=",l1
81: If dotP(l1,l1)=0 Then
82:   Disp "Cannot deal with the zero vector."
83:   Goto lent11
84: EndIf
85: Goto lmain
86: Lbl lent12
87: Disp "Enter L2 as a list {...}"
88: Input "L2=",l2
89: If dotP(l2,l2)=0 Then
90:   Disp "Cannot deal with the zero vector."
91:   Goto lent12
92: EndIf
93: Goto lmain
94: Lbl l1d12
95: dotP(l1,l2)→d
96: Disp "L1 dot L2 is ",d
97: Goto lmain
98: Lbl l1x12
99: crossP(l1,l2)→l3
100: Disp "L1 X L2 is"
101: Pause L3
102: Goto lmain
103: Lbl lswap
104: l1→ls
105: l2→l1
106: ls→l2
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107: Disp "Swapped L1 and L2"
108: Lbl ldisp
109: Disp "Press return after each"
110: Disp "L1="
111: Pause L1
112: Disp "L2="
113: Pause L2
114: Goto lmore2
115: Lbl lmgntd
116:  $\sqrt{\text{dotP}(l1,l1)} \rightarrow l1m$ 
117:  $\sqrt{\text{dotP}(l2,l2)} \rightarrow l2m$ 
118: Disp "Magnitude of L1=",l1m
119: Disp "Magnitude of L2=",l2m
120: Goto lmore2
121: Lbl langle
122:  $\cos^{-1}(\text{dotP}(l1,l2)/\sqrt{\text{dotP}(l1,l1)*\text{dotP}(l2,l2)}) \rightarrow c$ 
123: Disp "Angle between L1 and L2 is"
124: disp "in radians..."
125: Pause c
126: disp "in degrees..."
127: Pause(c*180)/ $\pi$ 
128: Goto lmore2
129: Lbl lunit
130:  $\sqrt{\text{dotP}(l1,l1)} \rightarrow l1a$ 
131:  $\sqrt{\text{dotP}(l2,l2)} \rightarrow l2b$ 
132: 1/l1a*l1  $\rightarrow$  l5
133: 1/l2b*l2  $\rightarrow$  l6
134: Disp "Press Enter after each"
135: Disp "Unit vector in direction L1 is"
136: Pause l5
137: Disp "Unit vector in direction L2 is"
138: Pause l6
139: Goto lmore3
140: Lbl ldrct
141:  $\sqrt{\text{dotP}(l1,l1)} \rightarrow l1a$ 
142:  $\sqrt{\text{dotP}(l2,l2)} \rightarrow l2b$ 
143:  $\cos^{-1}(l1/l1a) \rightarrow l5$ 
144:  $\cos^{-1}(l2/l2b) \rightarrow l6$ 
145: Disp "Direction Angles for L1"
146: Disp "in radians..."
147: Pause l5
148: Disp "in degrees..."
149: Pause 180/ $\pi$ *l5
150: Pause "Paused..."
151: Disp "Direction Angles for L2"
152: Disp "in radians..."
153: Pause l6
154: disp "in degrees"
155: Pause 180/ $\pi$ *l6
156: Goto lmore3
157: Lbl lproj
158:  $\text{dotP}(l1,l2)/\text{dotP}(l2,l2)*l2 \rightarrow l5$ 
159: Disp "Press Enter after each"

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160: Disp "Projection of L1 onto L2 is"  
161: Pause 15  
162: dotP(l1,l2)/dotP(l1,l1)*l1→l6  
163: Disp "Projection of L2 onto L1 is"  
164: Pause 16  
165: Goto lmore3  
166: Lbl lquit  
167: setMode("Angle",ma)  
168: setMode("Display Digits",mdd)  
169: setMode("Exact/Approx",mea)  
170: Stop  
171: EndPrgm
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