Two Alt. Solns to 16, Evening Quiz 3

1) 1st build $\vec{AB} = <1,1,3>$, $\vec{AC} = <-2,3,-6>$.

$\hookrightarrow$ $\vec{AB} \times \vec{AC} = <-15,0,5>$ (from original solution)

is the normal vector of plane containing A, B, C pts. (Chose pt A)

$\hookrightarrow$ Plane Eqn of this plane is thus $-15(x-1) + 5(z-3) = 0$.

We see Pt D satisfies this plane eqn $\Rightarrow$ $-15(-3-1) + 5(-9-3)$

$= 60 - 60 = 0$ ✓

Thus, D is also on the
same plane as A, B, C $\rightarrow$ All coplanar ✓

2) 1st build $\vec{AB} = <1,1,3>$, $\vec{BC} = <-3,2,-9>$, $\vec{CD} = <-2,-5,-6>$.

$\vec{AB} \times \vec{BC} = <-15,0,5>$ and $\vec{BC} \times \vec{CD} = <-57,0,19>$.

These are the normal vectors of planes which
the 1st one contains A, B, C; the 2nd contains B, C, D.

$\begin{cases} 1^{st} \text{ plane eqn} \Rightarrow -15(x-2) + 5(z-6) = 0. \quad \text{using pt B.} \\ 2^{nd} \text{ plane eqn} \Rightarrow -57(x-2) + 19(z-6) = 0. \quad \text{using pt B again.} \end{cases}$

$\Rightarrow$ Divide 1st by 5, divide 2nd by 19, it's the same plane!

Thus, A, B, C and also B, C, D all lie in the same

plane $-3(x-2) + (z-6) = 0$ $\Rightarrow$ coplanar.