(1) When are the material and local derivatives (of some property of a fluid) equal?

A. **When the fluid at the location and time of measurement isn't moving.** *[When a fluid parcel isn't moving, a property of that parcel evaluated at closely (infinitesimally) spaced times is also recorded at the same, fixed location, which is how the local derivative is evaluated. Hence, the material and local derivatives would be the same in this case.]*
B. When the property isn't changing at the location of interest.
C. When the property of interest is conserved by the fluid parcel.
D. When the observer/instrument is "following" a fluid parcel.
E. Never—they are mutually exclusive types of derivatives.

(2) When are the total and material derivatives (of some property of a fluid) equal?

A. When the fluid at the location and time of measurement isn't moving.
B. When the property isn't changing at the location of interest.
C. When the property of interest is conserved by the fluid parcel.
D. **When the observer/instrument is "following" a fluid parcel.**
   [The observer/instrument has to record the property of the same fluid parcel over time for the derivative that it measures to be a material derivative, which requires that the observer/instrument "follow" the parcel.]
E. Never—they are mutually exclusive types of derivatives.

(3) When are the total, material, and local derivatives (of some property of a fluid) equal?

A. When the fluid at the location and time of measurement isn't moving.
B. When the property of interest is conserved by the fluid parcel.
C. When neither the observer/instrument nor the fluid parcel are moving. *[In this case, for all three derivatives the values of the property of interest are recorded at closely (infinitesimally) spaced times at the same location and hence would all result in the same value of the derivative.]*
D. When the observer/instrument is "following" a fluid parcel.
E. Never—they are mutually exclusive types of derivatives.