4 (a) The $Cl(E)$ is the set of all the points within E or on the boundary of E. Similarly with $Cl(E^c)$, it is all the points with (E^c), all the points outside of E, but still contains the points on the boundary of E^c, also E.

As for $Int(E)$, it is the union of all the points within E. not the boundary However if we take the compliment of $Int(E)$, it is now all the points outside of E and the boundary points of E.

Hence both $Cl(E^c)$ and $Int(E)^c$ both refer to the union of E^c and the boundary/limit points of E, and $\therefore$

$$Cl(E^c) = Int(E)^c$$

(b) Recall, $Cl(E)$ is the union of all points within E and its boundary/limit points. $Int(E^c)$ is the set of all interior points of the compliment of E (not including limit points). Therefore, if we were to take the compliment of $Int(E^c)$, it would consist of all the interior points and limit points of E.

Hence $Cl(E) = Int(E^c)^c$

(c) I'm conflicted with does $Cl(E) = Cl(Int(E))$.

The closure of a set includes the limit points, even if they do not with the set. Hence, even though the $int(E)$ is only the interior points and not the limit points, $Cl(Int(E))$ expands to include the limit points as well. Hence $Cl(E) = Cl(Int(E))$.

(d) $Int(E)$ only consists of the interior points. $Cl(E) = Int(E) +$ limit points.

Therefore if we were to $Int(Cl(E)) = Int(E) +$ ~~limit~~ points and the limit points would be excluded because they are not in the intersection. Hence $Int(Cl(E)) = Int(E)$.