#3. a) $cl\,A = [0,3] \cup \{4\}$

$int\,A = (0,1) \cup (1,2)$

$\partial A = \{0,1\} \cup [2,3] \cup \{4\}$

b.) Both sides work out to be $[0,2]$

c.) On one hand,

$int\,A \subset cl(int\,A)$, since $B \subset cl\,B \;\forall B$

Then, since int A is an open set in $cl(int\,A)$, it has to be contained in ~~int~~ ~~its~~ in interior.

That is:

$int\,A \subset int(cl(int\,A))$.

But then $cl(int\,A) \subset cl(int(cl(int\,A)))$

This is because

$C \subset D \Rightarrow cl\,C \subset cl\,D, \;\forall C, D$ sets.

$D \subset cl(D) \;\forall D$.

Argument: ~~...~~ If also $C \subset D$, then $C \subset cl(D)$.

But $cl(D)$ is a closed set containing C, so by def of "closure", we must have

$cl\,C \subset cl\,D$.

On the other hand, $B \supset int\,B \;\forall B$ sets, so

$cl(int\,A) \supset int(cl(int\,A))$.

So we have $D = int(cl(int\,A))$ contained in a closed set, so $cl(D)$ must be in that set. So

$cl(int\,A) \supset cl(int(cl(int\,A)))$