3a) $B\hat{A}C = \frac{1}{2} B\hat{O}C$ (inscribed & central angle intercepting arc $\overset{\frown}{BC}$)
$= 50^\circ$.
$C\hat{O}A = 80^\circ$ (proved)
[OD) is bisector of $C\hat{O}A$ (given)
Thus, $D\hat{O}A = \frac{C\hat{O}A}{2}$
$= 40^\circ$.

b). In quadrilateral CDOI we have:
C is a pt on (C) of diameter [AB] (given)
then, $A\hat{C}B = 90^\circ$ (inscribed angle facing diameter).
but $B\hat{A}C = 50^\circ$ (proved)
So, $A\hat{B}C = 40^\circ$ (sum of base angles in a right Δ)
but $OB = OC$ (radii of (C))
then Δ OBC is isosceles at O (having two equal sides
but $B\hat{O}C = 100^\circ$ (given)
& base angles in an isosceles Δ are equal
then $O\hat{C}B = \frac{180 - C\hat{O}B}{2}$ (sum of angles in a Δ)
$O\hat{C}B = 40^\circ$
then, $O\hat{C}B = C\hat{O}D = 40^\circ$ (by comparison)
hence (OD) // (CB) (line included between equal alt.
but I belongs to (CB) interior angles)
So, (OD) // (CI)
& (CD) // (OI) given.
Thus, CDOI is a parallelogram (having 2 pairs of // sides).

c) CDOI is a parallelogram (proved)
then, $\vec{OI} = \vec{DC}$.
Thus, C is the image of D by $\vec{OI}$.

d) CDOI is a parm (proved)
d) So, P is midpt of diagonal [DI]
OE = OF (radii of (C))
So, OEF is isosceles at O.
but (OP) $\perp$ (EF) given)
then, (OP) is a median relative to [EF].
hence, P is midpt of diagonal [EF]
Thus, DEFI is parm.