(a) Following the definitions, we have

$$\partial C_{F,G} = -(C_{F,G})_{(1,0)} + (C_{F,G})_{(1,1)} + (C_{F,G})_{(2,0)} - (C_{F,G})_{(2,1)} - (C_{F,G})_{(3,0)} + (C_{F,G})_{(3,1)}$$

where

$$(C_{F,G})_{(1,0)}(u,v) = C_{F,G}(0,u,v) = F(0,u) - G(0,v) = C_{F_0,G_0}(u,v)$$
$$(C_{F,G})_{(1,1)}(u,v) = C_{F,G}(1,u,v) = F(1,u) - G(1,v) = C_{F_1,G_1}(u,v)$$
$$(C_{F,G})_{(2,0)}(s,v) = C_{F,G}(s,0,v) = F(s,0) - G(s,v)$$
$$(C_{F,G})_{(2,1)}(s,v) = C_{F,G}(s,1,v) = F(s,1) - G(s,v)$$
$$(C_{F,G})_{(3,0)}(s,u) = C_{F,G}(s,u,0) = F(s,u) - G(s,0)$$
$$(C_{F,G})_{(3,1)}(s,v) = C_{F,G}(s,u,1) = F(s,u) - G(s,1)$$

Since each F_s is closed, i.e. $F(s,0) = F(s,1)$, for all s, we see that $(C_{F,G})_{(2,0)} = (C_{F,G})_{(2,1)}$.

Similarly, since each G_s is closed, $(C_{F,G})_{(3,0)} = (C_{F,G})_{(3,1)}$. Thus, the only surviving terms of $\partial C_{F,G}$ are those due to $(C_{F,G})_{(1,0)}$ and $(C_{F,G})_{(1,1)}$. So $\partial C_{F,G} = C_{F_1,G_1} - C_{F_0,G_0}$ follows.

(b) If $d\omega = 0$ then by (a) and Theorem 4-13 (Stoke's theorem), we get

$$0 = \int_{C_{F,G}} d\omega = \int_{\partial C_{F,G}} \omega = \int_{C_{F_1,G_1}} \omega - \int_{C_{F_0,G_0}} \omega$$

so we conclude $\int_{C_{F_1,G_1}} \omega = \int_{C_{F_0,G_0}} \omega$.