#9

$h(x) = \max \{f(x), g(x)\} \quad x \in C$

$X, Y \in C \quad$ and $\quad 0 < t < 1$

let $h((1-t)X + tY) = f((1-t)X + tY)$

since $f(X)$ is convex

$h((1-t)X + tY) = f((1-t)X + tY) \le (1-t)f(X) + tf(Y)$

$$\le (1-t)h(X) + th(Y)$$

$\implies h$ is convex