Problem 3(c)

Consider (x_M, z) and (x_M', z') where $x_M > x_M'$
$z' > z$

From the IC constraints: $\mathbb{E}[y]$ such that $x_M + z < x_M' + z'$

$$w - Pr[x_M < x_E]\left[x_M + z + \frac{1}{2}\right] \geq w' - Pr[x_M' < x_E]\left[x_M + z + \frac{1}{2}\right]$$

$$w - Pr[x_M < x_E]\left[x_M' + z' + \frac{1}{2}\right] \leq w' - Pr[x_M' < x_E]\left[x_M' + z' + \frac{1}{2}\right]$$

type (x_M, z) doesn't want to change x_M to x_M'

type (x_M', z') doesn't want to change x_M' to x_M.

$$Pr[x_M < x_E]\left[x_M' - x_M + z' - z\right] \geq Pr[x_M' < x_E]\left[x_M' - x_M + z' - z\right]$$

$$Pr[x_M < x_E] \geq Pr[x_M' < x_E]$$

Contradiction with $x_M > x_M'$!

$x_M' - x_M + z' - z > 0$ By construction