> *king evaluations are useful* **for** *stabilizing the early game evaluations*

> t_1 : *territorial evaluation* **by** *queen moves* $\cdot$ (*plays reasonably . especially shortly before the filling phase*)

> t_2 : *territorial evaluation* **by** *king moves* $\cdot$ (*useful* **in** *beginning of game, less significant as the game goes on*)

> c_1 : **local** *advantage relative* **to** *queen moves* $\cdot$ (*counter balances early game territorial evaluation drawbacks*)

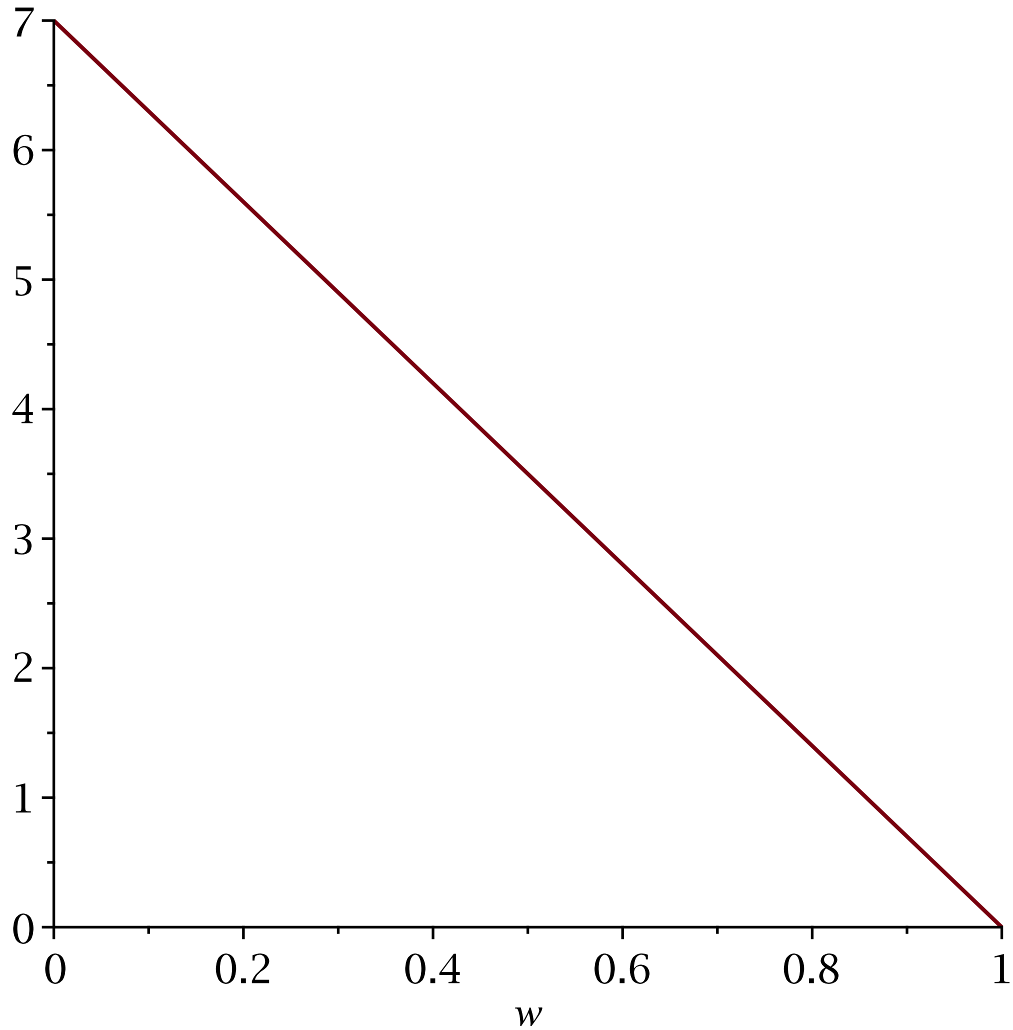
> c_2 : **local** *advantage relative* **to** *king moves* $\cdot$ (*only large values represent a clear advantage* **for** *one player*)

> w : *decreases as game goes on, becomes zero when all that's left is* **to** *fill* **in** *the board* $\cdot$ (*ie. the winner can be calculated based on moves remaining*)

> $f_1 := (w) \rightarrow 7 \cdot (1 - w)$

$$f_1 := w \mapsto 7\,(1 + (-w)) \tag{1}$$

> $plot(f_1(w), w = 0..1)$

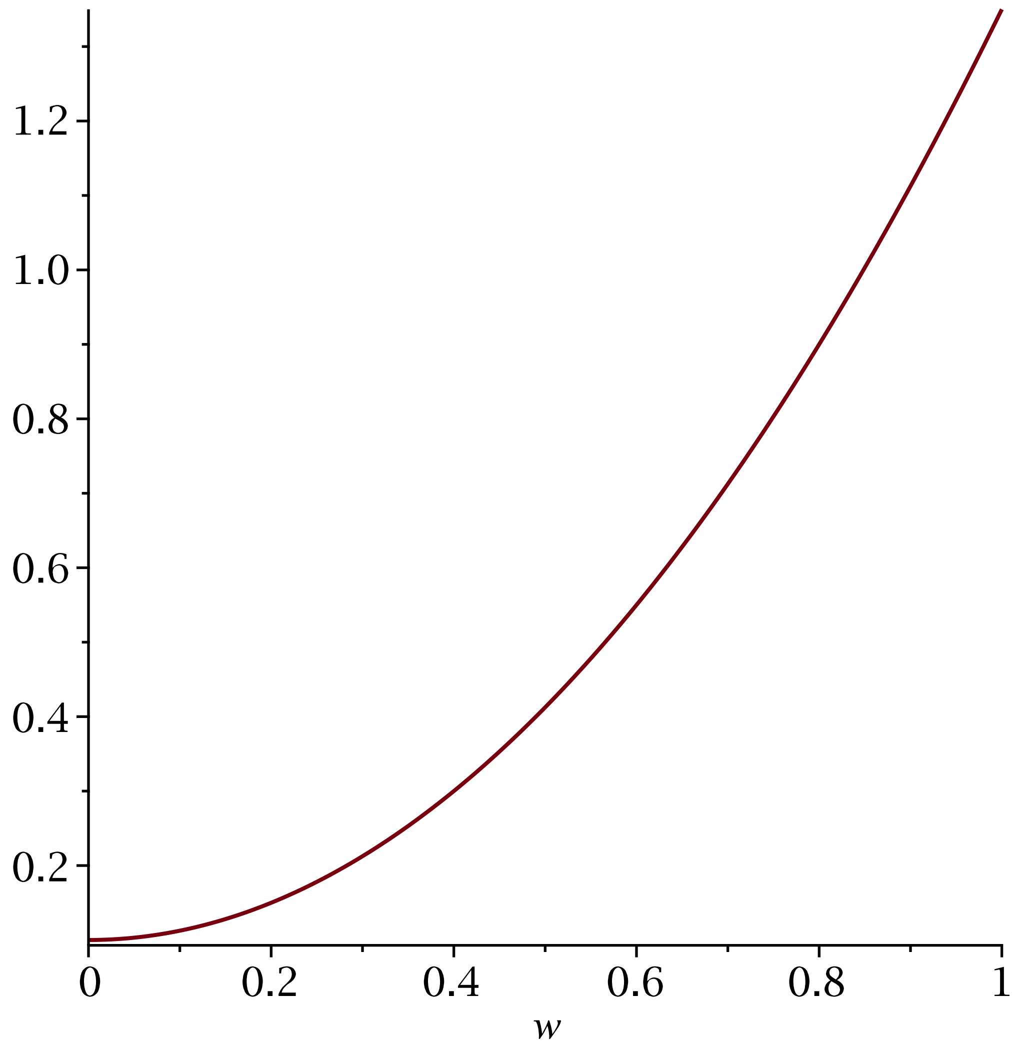


> $f_2 := (w) \rightarrow \frac{10 \cdot w \cdot w}{8} + 0.1$

(2)

$$f_2 := w \mapsto 10\, w\, w \cdot \left(\frac{1}{8}\right) + 0.1 \quad (2)$$

> $plot(f_2(w),\ w = 0..1)$



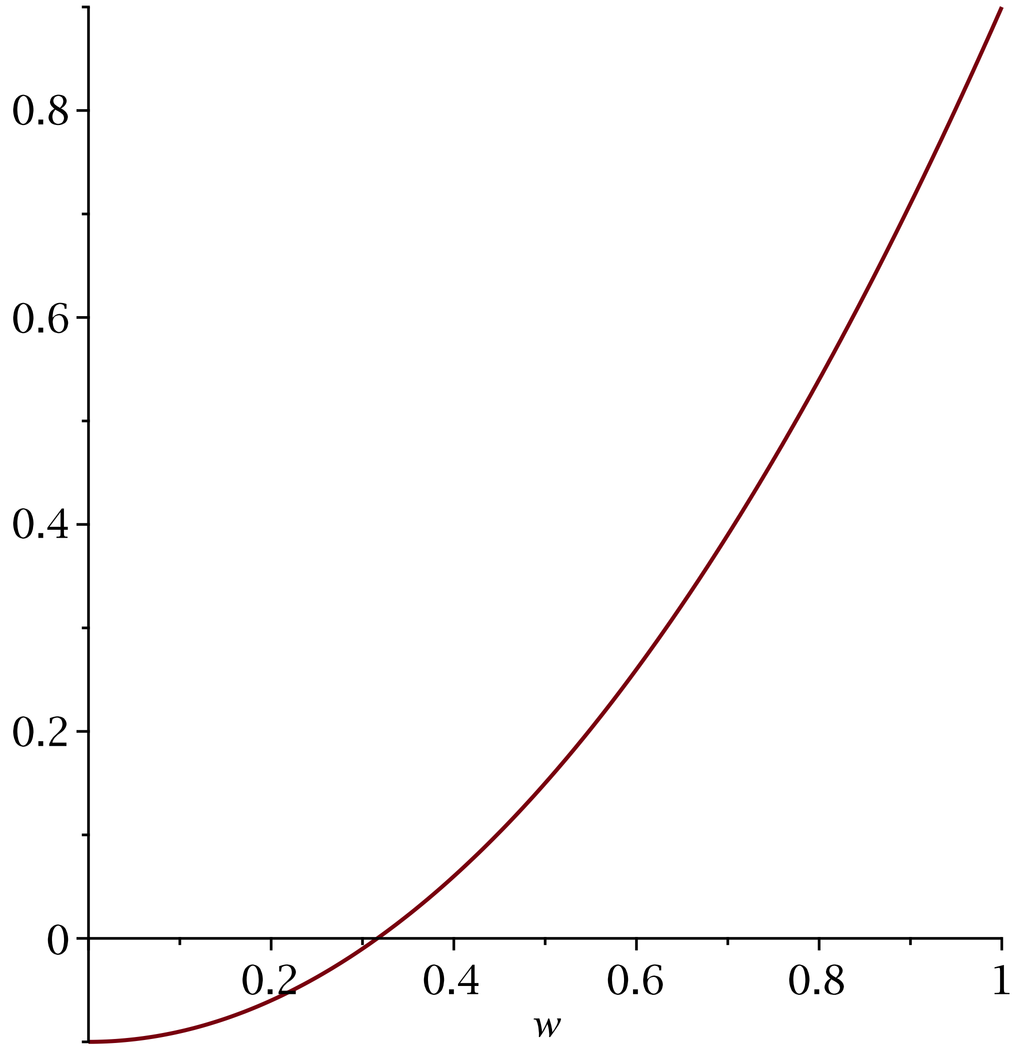
> $f_3 := (w) \rightarrow w \cdot w - 0.1$

$$f_3 := w \mapsto w\, w - 0.1 \quad (3)$$

> $f_3(0.5),\ f_2(0.5)$

$$0.15,\ 0.4125000000 \quad (4)$$

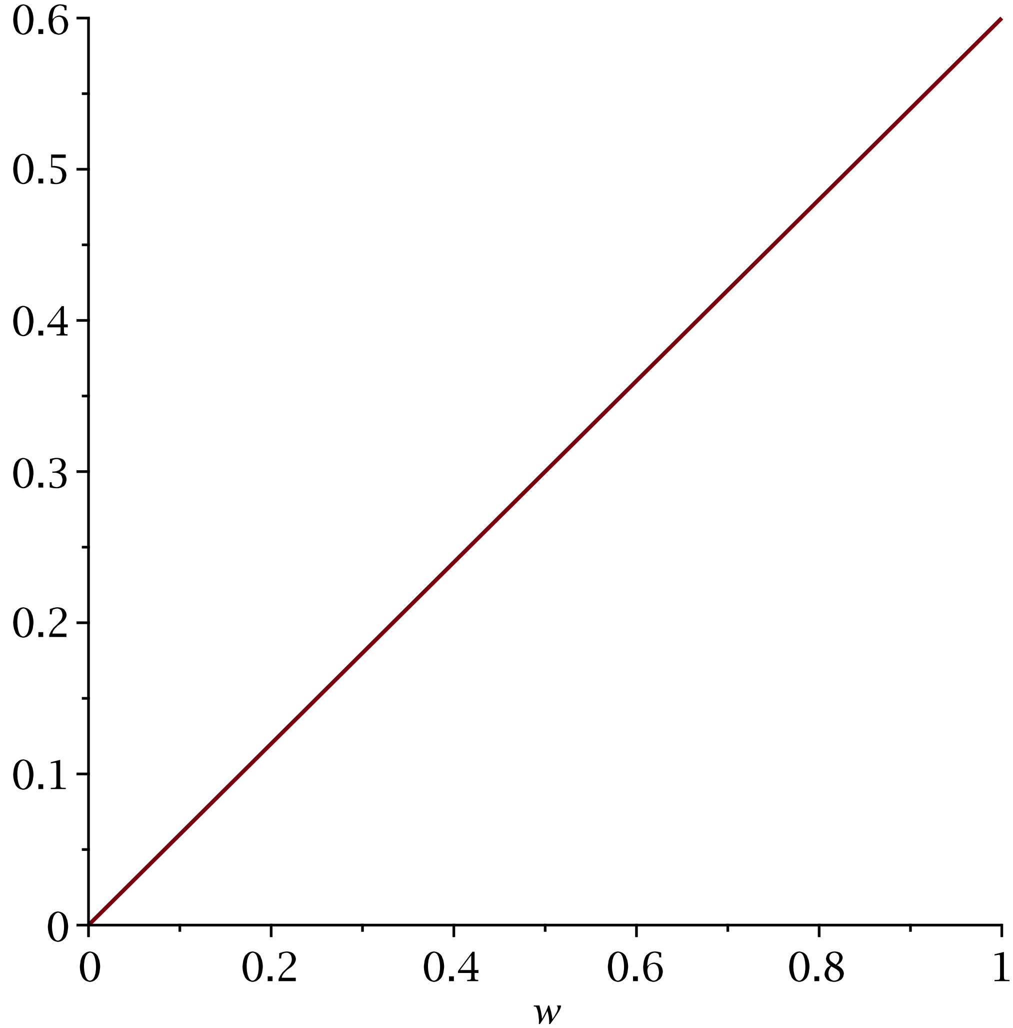
> $plot(f_3(w),\ w = 0..1)$



> $f_4 := (w) \rightarrow \frac{3}{5} w$

$$f_4 := w \mapsto 3 \cdot \left(\frac{1}{5}\right) w \tag{5}$$

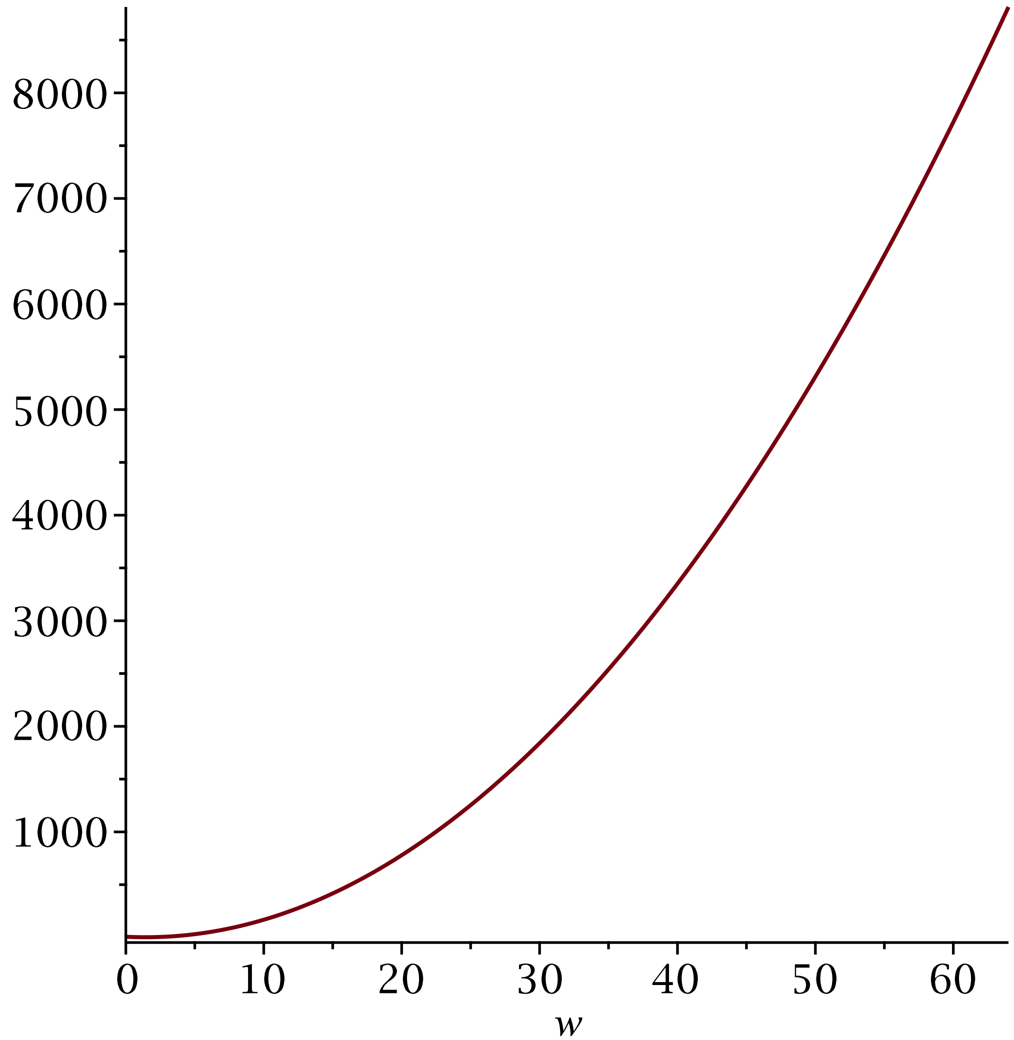
> $plot(f_4(w), w = 0..1)$



> $g := (w) \rightarrow f_1(w) + f_2(w) + f_3(w) + f_4(w)$

$$g := w \mapsto f_1(w) + f_2(w) + f_3(w) + f_4(w) \quad \textbf{(6)}$$

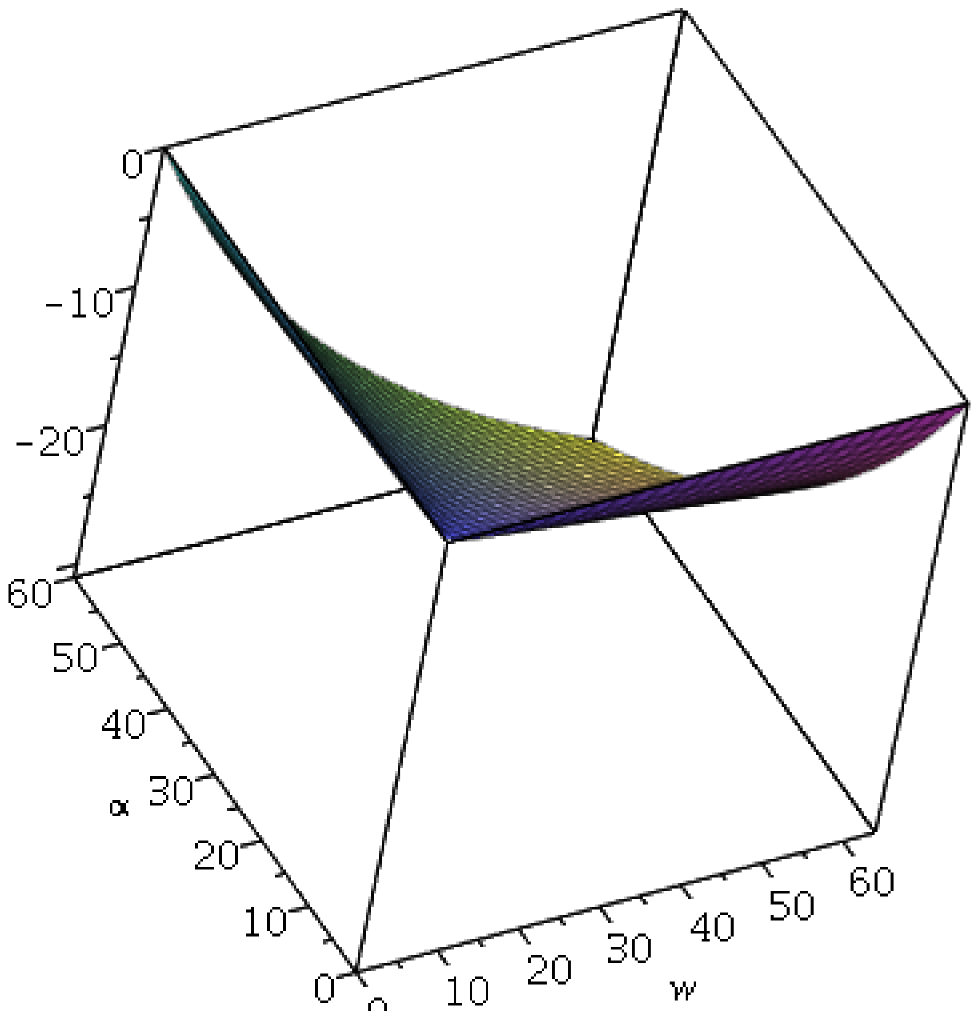
> $plot(g(w),\ w = 0\,..64)$



> $f := (w, \alpha) \rightarrow \frac{-w}{\alpha + w} \cdot \alpha$

$$f := (w, \alpha) \mapsto (-w)\,\frac{1}{\alpha + w}\,\alpha \qquad (7)$$

> $plot3d(f(w, \alpha),\ w = 0 ..64, \alpha = 0 ..60)$



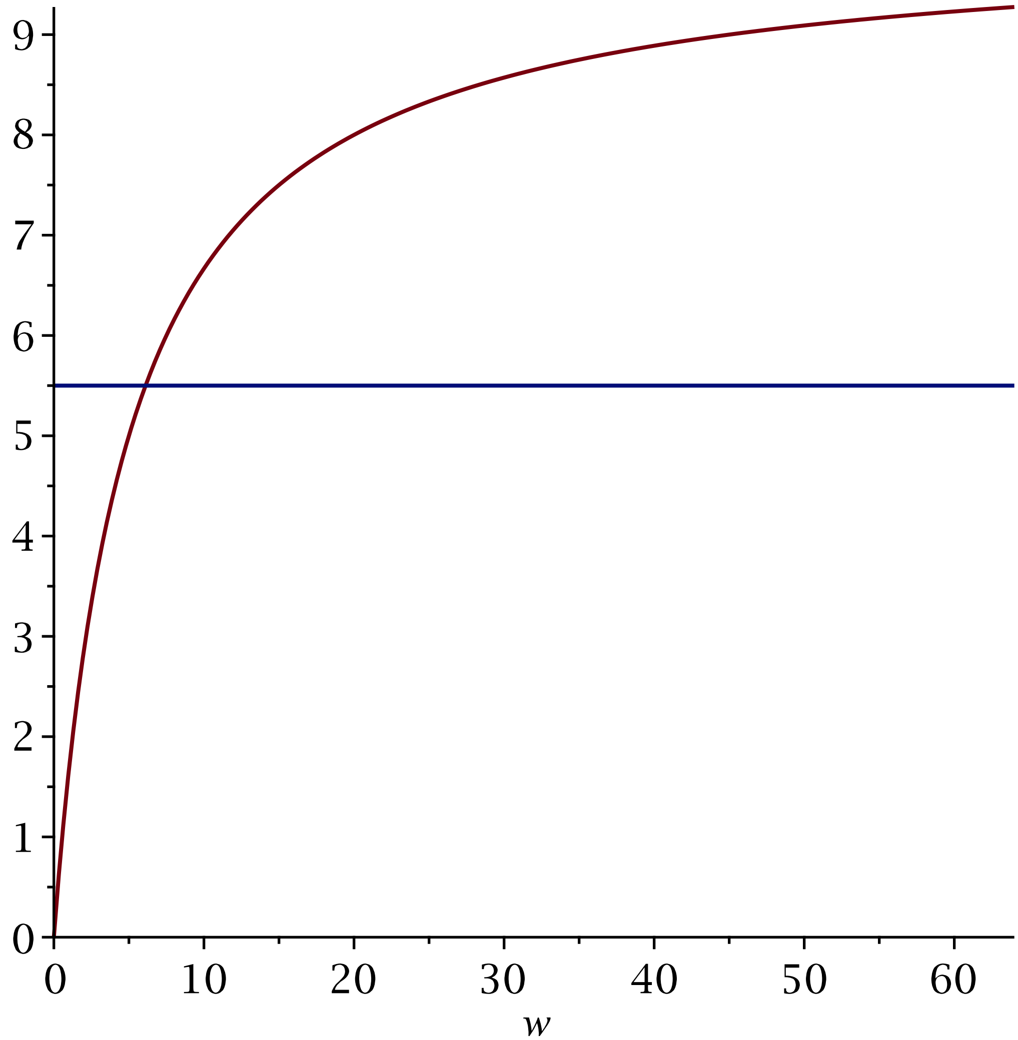
> $\frac{df}{d\alpha} = diff(f(w, \alpha), \alpha)$

$$\frac{df}{d\alpha} = \frac{4\,w}{(\alpha + w)^2} \quad (8)$$

> $2 \cdot f(w, 5) < f(w, 0)$

$$\frac{10\,w}{5 + w} < 5.5 \quad (9)$$

> $plot([2 \cdot f(w, 5), f(w, 0)], w = 0 ..64)$



9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
w

>