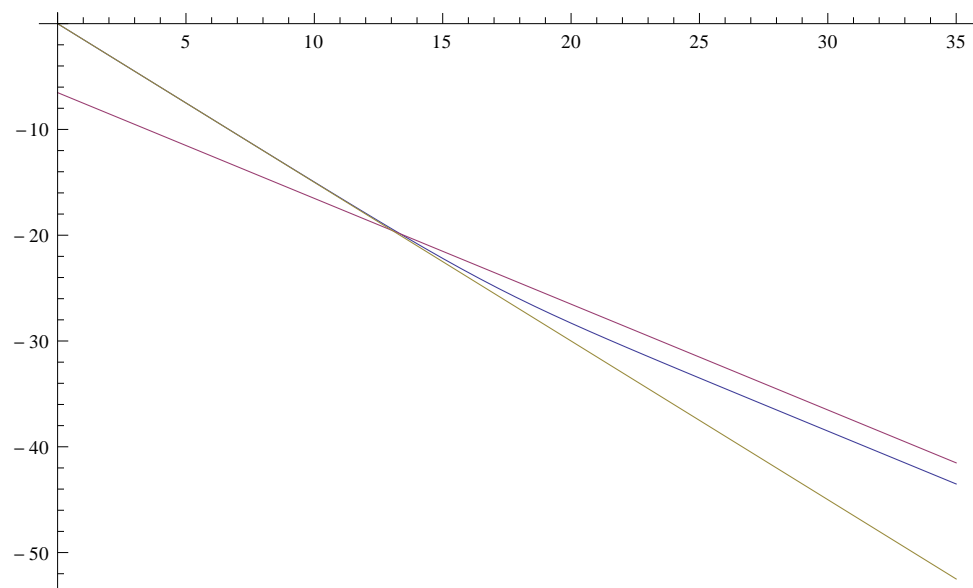a = 0.0002; Plot[{Log[Exp[-1.5 t] + a * Exp[-t]], -t - 6.52, -1.5 t + Log[1 + a]}, {t, 0, 35}]

Plot[{D[Log[Exp[-1.5 t] + a * Exp[-t]], t] /. t → x}, {x, 0, 25}]