Lab 1
Design & verify controller for a robot avoiding obstacles
- Accelerate / brake (discrete dynamics)
- 1D motion (continuous dynamics)

Lab 2
Design & verify controller for a robot avoiding obstacles
- Accel / brake / steer (discrete dynamics)
- 2D motion (continuous dynamics)

Lab 3
Design & verify controller for a robot avoiding obstacles
- Dynamic obstacles (other agents)
- Avoid collisions (define safety)

Lab 4
Design & verify controller for a robot avoiding obstacles
- Control robot (respect delays)
- Environment interaction (obstacles, agents, uncertainty)

Teaching CPS Foundations With Contracts
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- pre-/post condition
- rigorous reasoning
- operational effects
- core principles

@requires (v'² <= 2*b*(m-x))
@requires (v>=0 & A>=0 & b >= 0)
@ensures (x<=-m)
{ if (v'² <= 2*b*(m-x)) - (A*b)*v*(A+2*b) )
  a := A;
} else {
  a := -b;
}
t := 0;
{x:=y, v:=w, t:=1, v>=0 & t<=1}
# @invariant (v'² <= 2*b*(m-x))