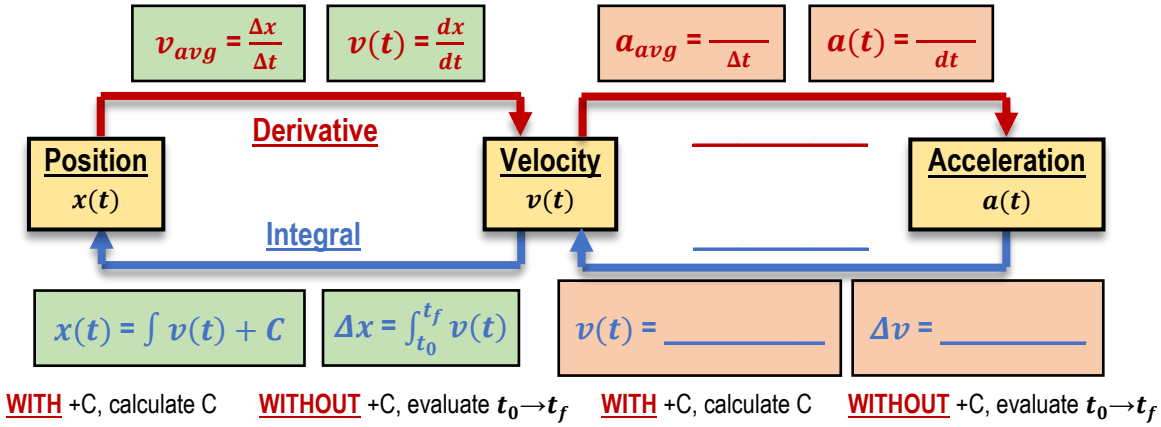
## CONCEPT: SOLVING PROBLEMS WITH VELOCITY AND ACCELERATION FUNCTIONS

- Problems often GIVE a function for one motion variable [$x(t)$, $v(t)$, or $a(t)$] and ASK for a *different* variable.
  - Solve $v(t) \Leftrightarrow a(t)$ problems using the *SAME* operations as $x(t) \Leftrightarrow v(t)$.

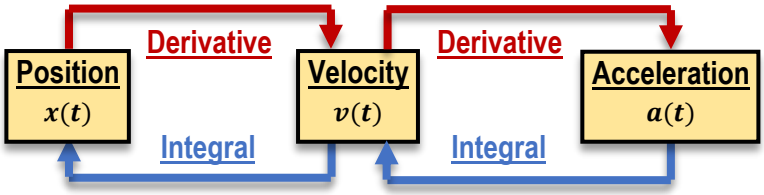



EXAMPLE: A car's position function **x(t)** = $t^3 - 4t^2 + 9$. Calculate the car's acceleration at t = 2s.

EXAMPLE: A car's acceleration is given by **a(t)** = 2t - 4. Calculate the change in velocity from t = 3s to t = 5s.

PROBLEM: A jet moves with a velocity of $\boldsymbol{v(t) = -e^{0.5t} + 1.5t^2}$. What is the jet's acceleration from t = 2.4s to t = 5.6s?

**A)** 25.3 m/s$^2$
**B)** –221 m/s$^2$
**C)** –120 m/s$^2$
**D)** 35.2 m/s$^2$




PROBLEM: The function $\boldsymbol{a(t) = 4 - sin(t)}$ describes the acceleration of a particle. At t = 0, the particle is at x = –20m and moving with a velocity of +2 m/s. What is the particle's position at t=8 s?

**A)** x = 117 m
**B)** x = 101 m
**C)** x = 245 m
**D)** x = 115 m