

1-1. A truck starts from rest with an acceleration of $a \sim N(2, 0.2^2)$ m/s², after the truck has traveled for 5 seconds, determine the distributions of the velocity and distance that the truck traveled.

Solution

$$v = v_0 + at$$

$$\mu_v = v_0 + \mu_a t = 0 + 2(5) = 10 \text{ m/s}$$

$$\sigma_v = t\sigma_a = 5(0.2) = 1 \text{ m/s}$$

$$s = s_0 + v_0 t + \frac{1}{2} at^2$$

$$\mu_s = s_0 + 0 + \frac{1}{2} \mu_a t^2 = 0 + \frac{1}{2} (2)(5)^2 = 25 \text{ m}$$

$$\sigma_s = \frac{1}{2} t^2 \sigma_a = \frac{1}{2} (5)^2 (0.2) = 2.5 \text{ m}$$

Therefore, $v \sim N(10, 1^2)$ m/s and $s \sim N(25, 2.5^2)$ m.

Ans.