

Typical.

Faculty of Engineering	Philadelphia University	Mechanical Eng. Dep.
Course name: Dynamics	First Quiz	Course number: 620212 class(3)
Instructor: Eng. Laith Batarseh	Tuesday 6/11/2018	Allowed time: 10 minutes

Student Name:

Student ID number:

Problem: The motion of a particle is defined by the relation $x = t^4 - 10t^2 + 8t + 12$, where x and t are expressed in meter and seconds, respectively. Determine the position, the velocity, and the acceleration of the particle when $t = 1$ s.

$$X(1) = (1)^4 - 10(1)^2 + 8(1) + 12 = 11 \text{ m}$$

$$V = \frac{dx}{dt} = 4t^3 - 20t + 8$$

$$V(1) = 4(1)^3 - (20)(1) + 8 = -8 \text{ m/s}$$

$$a = \frac{dv}{dt} = 12t^2 - 20$$

$$a(1) = 12(1)^2 - 20 = -8 \text{ m/s}^2$$

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$x = 3t^3 - 9t^2 + 12t + 10$
Problem: The motion of a particle is defined by the relation ~~$x = 4 - 10t^2 + 8t + 12$~~ , where x and t are expressed in meter and seconds, respectively. Determine the position, the velocity, and the acceleration of the particle when $t = 2$ s.

$$x = 3t^3 - 9t^2 + 12t + 10$$

$$x(2) = 3(2)^3 - (9)(2)^2 + 12(2) + 10 = 22 \text{ m}$$

$$v = \frac{dx}{dt} = 9t^2 - 18t + 12 = 12 \frac{\text{m}}{\text{s}}$$

$$a = 18t - 18 \quad a(2) = 18 \frac{\text{m}}{\text{s}^2}$$

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Problem: The motion of a particle is defined by the relation $x = 6t^4 - 2t^3 - 12t^2 + 3t + 3$, where x and t are expressed in meter and seconds, respectively. Determine the position, the velocity, and the acceleration of the particle when $t = 3$ s.

$$X = 6(3)^4 - 2(3)^3 - 12(3)^2 + (3)(3) + 3 = 336 \text{ m}$$

$$V = \frac{dx}{dt} = 24t^3 - 6t^2 - 24t + 3$$

$$V(3) = 525 \frac{\text{m}}{\text{s}}$$

$$a = \frac{dv}{dt} = 72t^2 - 12t - 24$$

$$a(3) = 588 \frac{\text{m}}{\text{s}^2}$$

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Problem: The motion of a particle is defined by the relation $x = t^3 - 9t^2 + 24t - 8$, where x and t are expressed in meter and seconds, respectively. Determine the position, the velocity, and the acceleration of the particle when $t = 4$ s.

$$X(4) = (4)^3 - 9(4)^2 + 24(4) - 8 = 8 \text{ m}$$

$$V = \frac{dx}{dt} = 3t^2 - 18t + 24$$

$$V(4) = 0 \text{ m/s}$$

$$a = 6t - 18$$

$$a(4) = 6 \frac{\text{m}}{\text{s}^2}$$