Solutions for Quiz 2, Section A03

Compute the velocity vector at time $t = 3$ of a particle moving on the trajectory $\vec{r}(t) = \langle t + \cos(2\pi t), e^{2t}, t^2 \rangle$.

Solution: The verity vector is the derivative of the position vector, so we can compute:

$$\vec{v}(t) = \frac{d}{dt} \langle t + \cos(2\pi t), e^{2t}, t^2 \rangle$$
$$= \langle 1 - 2\pi \sin(2\pi t), 2e^{2t}, 2t \rangle$$

Plugging in time $t = 3$, we get:

$$\vec{v}(3) = \langle 1 - 2\pi \sin(6\pi), 2e^6, 6 \rangle$$
$$= \langle 1, 2e^6, 6 \rangle$$