Find the following:

1) \( \text{proj}_B \vec{A} = \langle -i, \sin 2, \cos 2 \rangle \), \( \vec{B} = (2i)\hat{i} + \sin 2 \hat{j} + \cos 2 \hat{k} \)

2) The magnitude of \( \text{proj}_B \vec{A} \)

3) The equation for a parametric line normal to the plane \( 3x - 6y + 6z = -2 \) and passing through \((-1,3,-4)\) when the parameter is 0 and the with a z coordinate 6 when the parameter is 3

4) The distance from the line \( \vec{r}(t) = \langle 3t - 4, 2t + 3, 7 - 2t/3 \rangle \) to the point \((1,3,-4)\)

5) The equation of the plane containing the line \( \vec{r}(t) = \langle 3t - 4, 2t + 3, 7 - 2t/3 \rangle \) and the point \((1,3,-4)\)

6) The equation \( \vec{r}(t) = \langle \cos \pi t - 3, \sqrt{t}, t^2 - 60 \rangle \) describes the position of a particle in space. Find the projection of the acceleration vector on to the velocity vector when \( t=16 \). (You may need to round near the end.)

7) Find the equation for a vector defined function for the velocity at a given time \( t \) of a particle if its acceleration is given as \( \vec{a}(t) = \langle -e^{-t}, -t^3, -\cos \pi t \rangle \) and \( \vec{v}(1) = \langle \frac{e^{-1}}{e^1}, 9/4, 3 \rangle \).

8) Two vector valued curves \( \langle -\cos \frac{\pi}{2}t, t^2 - 4t + 3, \sin t \rangle \) and \( \langle \cos \frac{\pi}{2}t, -\cos \frac{\pi}{2}t, \sin t \rangle \) meet at time \( t=3 \). What is the angle formed between their normal vectors when the two curves meet?