1: What is wrong?

What is wrong with the code below? Name any two things (10 marks).

```
In [3]: def Damped_SHO_derivative(z, t, ω, ω_d, κ, ε):
            x = z[0]
        p = z[1]
        dxdt = p
        dpdt = -(ω**2)*x-κ*p+ε*np.cos(ω_d*t)
        return [dxdt,dydt]
```

2: What is wrong?

What is wrong with the code below ? Name any three things (15 marks).

```
In [ ]: for i in range(5)
            K= np.zero(dim,dim)
            G= np.zeros(3,3)
            F=K+G
```

3: On the Computer-1

Consider the anharmonic oscillator whose equation of motion is given by $\ddot{x} = -(x^3 - 1)\sin(x)$. Plot 15 instances of its phase trajectory for random values of the initial position and momentum between $x_0 \in (-2, 2)$ and $p_0 \in (-2, 2)$. Show your TAs (15 marks).

4: On the Computer-2

Generate three random $n \times n$ complex matrices A,B and C (5marks). Check that they obey Jacobi identity namely $[A, [B, C]] + [B, [C, A]] + [C, [A, B]] = 0$ (5 marks). Let your TAs choose n.