Quiz 6

1. Given the following code snippet to calculate the derivatives for the simple harmonic oscillator, rewrite it in the same style to calculate the derivatives for the equation:

$$\frac{\partial^2 u}{\partial t^2} + u\frac{\partial u}{\partial t} - \gamma u = 0$$

```
# create a structure coeff to hold values to be passed to the ode function
coeff.c1 = 0.0
coeff.c2 = 1.0

# function derivs
def derivs(coeff, y):
  f=empty_like(y)
  f[0] = y[1]
  f[1] = - coeff.c1*y[1] - coeff.c2*y[0]
  return f
```

Solution:

- Recognize that $y[0] \rightarrow u$, $y[1] \rightarrow \frac{\partial u}{\partial t}$, $f[0] \rightarrow \frac{\partial u}{\partial t}$ and $f[1] \rightarrow \frac{\partial^2 u}{\partial t^2}$
- Given that, the derivitives neee to be

```
f[0] = y[1]
f[1] = coeff.gamma*y[0] - y[0]*f[1]
```

2. Describe how the the white/black daisy fraction affects the climate in the daisy world model.

The equilibrium surface temperature depends on the planetary albedo, which in turns depends on the fraction of white and black daisies. More black daisies, more solar absorption, higher equilibrium surface temperature.