problem 3

$4t^3 - 3t + \sin(t)$

$f(t) = 4t^3 - 3t + \sin(t)$

$f(t) = \sum_{n=0}^{8} c_n h_n(t)$

$c_n = \langle h_n, f(t) \rangle$

$\int_0^1 h_0(t) f(t)\,dt \quad \int_0^1 4t^3 - 3t + \sin(t)\,dt = -0.04030$

$\int_0^1 h_1(t) f(t)\,dt = \int_0^{\frac{1}{2}} 4t^3 - 3t + \sin(t)\,dt + \int_{\frac{1}{2}}^1 -4t^3 + 3t - \sin(t)\,dt$

$= -0.19008 - 0.14978 = -0.33986$

$\int_0^1 h_2(t) f(t)\,dt = \int_0^{1/4} f(t)\,dt + \int_{1/4}^{1/2} -f(t)\,dt = -0.05876 + 0.13133$

$\int_0^1 h_3(t) f(t)\,dt = \int_{1/2}^{3/4} f(t)\,dt + \int_{3/4}^1 -f(t)\,dt = -0.06794 + (-0.21873)$

$\int_0^1 h_4(t) f(t)\,dt = \int_0^{1/8} f(t) + \int_{1/8}^{2/8} -f(t) = -0.015391 + 0.04327$

$h_5 \quad \int_{2/8}^{3/8} + \int_{3/8}^{4/8} = -0.06291 + 0.06841$

$h_6 \quad \int_{4/8}^{5/8} + \int_{5/8}^{6/8} = -0.05423 + 0.01472$

$h_7 \quad \int_{6/8}^{7/8} + \int_{7/8}^{1} = 0.0558 + (-0.16291)$

$c_n = -0.04030 \quad -0.33986 \quad 0.07257 \quad -0.28768$

$0.027979 \quad 0.0055 \quad -0.03951 \quad -0.10715$

```
clear
```