Exercise 1. Consider the heat conduction problem

$$u_t = u_{xx} \qquad\qquad 0 < x < 2,\ 0 < t,$$
$$u(0, t) = 0 \qquad\qquad 0 < t,$$
$$u_x(2, t) = -\frac{1}{3}u(2, t) \qquad\qquad 0 < t,$$
$$u(x, 0) = x \qquad\qquad 0 < x < 2.$$

a. Solve this problem. Express your answer explicitly in terms of μ_n (as in class). Be sure to state the equation satisfied by μ_n. [*Suggestion:* You may feel free to use a computer to evaluate the integrals appearing in the formulas for the generalized Fourier coefficients.]

b. Use Maple to compute the first 10 values of μ_n, λ_n and c_n.

c. Use Maple to plot (via the `animate` command or otherwise) the solution at various times (at least 10) throughout the interval $0 \leq t \leq 3$.

d. Submit a single Maple file containing the integral computations of part **a** and the results of parts **b** and **c** through TLEARN.

Exercise 2. Repeat the preceding exercise, replacing the initial temperature profile with

$$f(x) = \begin{cases} 100 & \text{if } 0 < x \leq 1, \\ 0 & \text{if } 1 < x < 2. \end{cases}$$

Submit a separate Maple file for this problem.