

3. (15 points) Solve $u_t = 3u_{xx}$ if $u_x(0, t) = 0 = u_x(2, t)$, $u(x, 0) = x$. Show the steps discussed in lecture.

4. (15 points) Solve $u_{xx} + u_{yy} = 0$ if $u_y(x, 0) = 0 = u_y(x, 1)$, $u(0, y) = 0$, and $u(2, y) = 6 + \cos(2\pi y)$. Show the steps discussed in lecture.

5. (15 points) Use Laplace transforms to solve $y'' - 4y = e^t$ if $y(0) = 1$ and $y'(0) = 0$.

6. (5 points) What is the Laplace transform of $f(t) = e^{2(t-2)}H(t-2)$?

7. (5 points) What is the inverse Laplace transform of $H(s) = \frac{s}{(s-1)^2 + 4}$?

8. (15 points) Draw the graph of the odd extension for $f(x) = H(x-1) - H(x-3)$, $0 \leq x < 4$, and then find the sine series expansion for $f(x)$.

