Be sure to turn in any missing or makeup HWs for half credit at the time of
the test. Remember HW counts 40% of the grade. If you made \( \ll 50\% \) on
any HW, you may turn in a makeup at the time of the test for a maximum
of half credit.

- HWs 7–12
- (1) \texttt{solve.c}
  Gaussian elimination (2.1–2.6 of Moler)
  forward elimination code, back substitution code, tridiagonal solver
- (2) \texttt{laplace.c}
  discretization of \( \nabla^2 u = 0 \) (11.2 of Moler & Laplace Equation Notes
  iterative solution equations (Jacobi, Gauss-Seidel, SOR)
- (3) \texttt{solvers.c}
  Jacobi, Gauss-Seidel, & SOR iterative method codes
- (4) linear & nonlinear BVPs
  \texttt{bvp1.c}, \texttt{bvp2.c}, \texttt{layer.c}, \texttt{bvp3.c}
  Newton’s method, residual, Jacobian (see Moler 7.22, p. 231)

Memorize:

\[
\left( \frac{du}{dx} \right)_i \approx \frac{u_{i+1} - u_{i-1}}{2\Delta x}
\]

\[
\left( \frac{d^2 u}{dx^2} \right)_i \approx \frac{u_{i+1} - 2u_i + u_{i-1}}{\Delta x^2}
\]

\[
u(x \pm \Delta x) = u(x) \pm \Delta x u'(x) + \frac{\Delta x^2}{2!} u''(x) + \frac{\Delta x^3}{3!} u'''(x) + \frac{\Delta x^4}{4!} u^{(4)}(x) \pm \cdots
\]

\[
\equiv u \pm \Delta x u' + \frac{\Delta x^2}{2!} u'' \pm \frac{\Delta x^3}{3!} u''' + \frac{\Delta x^4}{4!} u^{(4)} \pm \cdots
\]