Problem 7.
\[ T(20) = \frac{310}{7} \approx 44.3^\circ F. \]

Problem 8.
\[ y(x) = \frac{(15e^{-x} + e^{-9x})}{8} \]


Problem 10.
\[ \lambda_1 = 1, \quad \lambda_2 = 1 - 2i, \quad \lambda_3 = 1 - 2i, \]
\[ v_1 = (2, -3, 2), \quad v_2 = (0, 1, i), \quad v_3 = (0, 1, -i). \]

Problem 11. Not covered by our syllabus.

Problem 12.
\[ e^{t}(c_1 (\cos t, -\sin t) + c_2 (\sin t, \cos t)). \]