1. Do the following for each of the given quadratic forms: (i) classify the quadratic form as definite, indefinite, or semi-definite, by completing the square; (ii) find the zero set of each function; (iii) sketch the zero set, and determine the region(s) in the $xy$-plane where $f(x, y)$ is positive and negative.

   (a) $f(x, y) = 5xy - 10y^2$

   (b) $f(x, y) = -4x^2 + 8xy$

   (c) $f(x, y) = 2x^2 - 8xy - 10y^2$

   (d) $f(x, y) = -4x^2 - 8xy - 40y^2$

   (e) $f(x, y) = -2x^2 - 16xy - 32y^2$

   (f) $f(x, y) = 2x^2 - 12xy + 26y^2$

   (g) $f(x, y) = 5x^2 - 50xy + 125y^2$

   (h) $f(x, y) = -3x^2 - 30xy - 63y^2$