

# MATH 484 QUIZ 07 Graphical Dual Method

Name\_\_\_\_\_ Sec\_\_\_\_\_

$$\min f(y,z) = 6y + z - 2$$

subj to

$$g_1(y,z) = 3y - 2z \leq 12 = b_1$$

$$g_2(y,z) = 2y + 5z \geq -20 = b_2$$

$$g_3(y,z) = -y - 6z \geq -12 = b_3$$

$$g_4(y,z) = -y + 2z \leq 4 = b_4$$

1. Solve the given LP by the graphical dual method. Specifically, complete these steps:
  - a) Put all constraints in the form  $g \geq b$ . Subsequent instructions refer to the adjusted constraint functions  $g_i$
  - b) Graph the boundaries of the constraints and mark the feasible set. Label the boundaries according to which slack variable is zero ( $s_i = g_i - b_i$ ).
  - c) At each extreme point of the feasible set (i.e., at each intersection of two constraint boundaries  $s_i = 0$  and  $s_j = 0$ ), solve for the real numbers  $y_i$  and  $y_j$  such that  $\text{gradient}(f) = y_i \cdot \text{gradient}(g_i) + y_j \cdot \text{gradient}(g_j)$ .
  - d) The extreme point at which the solution  $y_i$  and  $y_j$  are non-negative is the minimum. Document  $\min(f)$  and  $\text{argmin}(f)$