Practice Problem on Cutting Planes.

Consider the following integer program:

Maximize $Z = x_1 + 3x_2 + 2x_3 + 4x_4$

s.t. $2x_1 + 2x_2 + x_3 + 2x_4 \leq 5$ (1)

$5x_1 + 3x_2 + 5x_3 + 2x_4 \leq 9$ (2)

$2x_1 + 3x_2 + 3x_4 \geq 5$ (3)

$x_1, x_2, x_3, x_4 \geq 0$ integer

Parts (a) - (c) below are independent of each other. You are given three fractional solutions which are feasible for the LP-relaxation of the problem. For each of the fractional points, give a cutting plane that will cut off the fractional solution.

a) (1, 0, 1/3, 1)

$x_1 + x_3 \leq 1$ based on constraint (2)

b) (0, 0, 0, 2.5)

$x_4 \leq 2$ based on constraint (1)

c) (0.25, 1.5, 0, 0)

$x_1 + x_2 + x_4 \geq 2$ based on constraint (3)