Answers are straight forward.

1. In exterior penalty function method
    a. Penalty value *P(X)* approaches to 1 as *X* approaches to boundary of feasible region
    b. Penalty value *P(X)* approaches to -1 as *X* approaches to boundary of feasible region
    c. Penalty value *P(X)* approaches to ∞ as *X* approaches to boundary of feasible region
    d. Penalty value *P(X)* approaches to 0 as *X* approaches to boundary of feasible region

2. Find the penalty function value at $(2,1)^T$

$$Minimize\ x_1 + x_2$$

$$subject\ to\ x_1^2 - x_2 \leq 2$$

   Take the penalty function as $P(X) = \text{Max}\{0, g_j(x)\}^4$
    a. 1
    b. 0
    c. 2
    d. -1
3. Exterior penalty function method generates a sequence for penalty parameter c_k, where the $f(X) + C_k\text{P(X)}$ is the equivalent objective function for minimization problem
    a. negative, monotonically increasing sequence
    b. nonnegative, monotonicallydecreasing sequence
    c. nonnegative, monotonically increasing sequence
    d. nonnegative and constant sequence
4. Consider the following problem

$$Minimize\ f(x,y) = (x-1)^2 + (y-5)^2$$
$$Subject\ to\ g_1(x,y) = -x^2 + y - 4 \leq 0$$
$$g_2(x,y) = -(x-2)^2 + y - 3 \leq 0$$

   Formulate the usable direction at $X_i = \begin{Bmatrix} 1 \\ 1 \end{Bmatrix}$ and the next iterative point in Zoutendijk's method.
    a. $(1,1)^T\ \ and\ X_2 = (1,5)^T$
    b. $(1,1)^T\ \ and\ X_2 = (2,5)^T$
    c. $(0,1)^T\ \ and\ X_2 = (1,5)^T$

d. $(1,0)^T$ $and\ X_2 = (1,1)^T$

5. Obtain Kelly's cutting planes for the following problem

$$minimize\ x_1^2 + x_2^2 - 6x_1 - 8x_2 + 10$$

$$subject\ to\ 4x_1^2 + x_2^2 - 16 \leq 0$$

$$3x_1 + 5x_2 \leq 15$$

$$x_i \geq 0, i = 1,2$$

with the starting optimal point $X_1{}^* = \begin{Bmatrix} 3 \\ 4 \end{Bmatrix}$

a. $6x_1 + 2x_2 - 17 \leq 0,\ 3x_1 + 5x_2 - 15 \leq 0$
b. $x_1 + 2x_2 + 27 \leq 0,\ 3x_1 - 5x_2 + 15 \leq 0$
c. $3x_1 - 2x_2 - 23 \leq 0,\ 3x_1 + 5x_2 - 5 \leq 0$
d. $6x_1 - 2x_2 - 17 \leq 0,\ 3x_1 - 5x_2 - 15 \leq 0$