Assignment 4

The due date for submitting this assignment has passed.

Due on 2021-03-17, 23:59 IST.

1) Question 1. Let us define a function $f(x) = x^2e^{-x}$. Let $f(x^*) = \min_{x \in \mathbb{R}} f(x)$. Then $x^*$ is:
   - $0$
   - $2$.
   - $5$.
   - none of these.
   No, the answer is incorrect. Score: 0.
   Accepted Answers: $0$.

2) Question 2. Let $x = (5, 3)$ and $y = (6, 4)$. Which of the following is a convex combination of $x$ and $y$?
   - $(5, 10)$
   - $(10, 5)$
   - $(9, 8)$.
   - none of these.
   No, the answer is incorrect. Score: 0.
   Accepted Answers: $0$.

3) Question 3. A convex set is affine. State TRUE or FALSE.
   No, the answer is incorrect. Score: 0.
   Accepted Answers: FALSE.

4) Question 4. The union of convex sets is convex. State TRUE or FALSE.
   No, the answer is incorrect. Score: 0.
   Accepted Answers: FALSE.

5) Question 5. The set $S = \{(x_1, x_2) \in \mathbb{R}^2 | x_1 + x_2 = 10\}$ is convex. State TRUE or FALSE.
   No, the answer is incorrect. Score: 0.
   Accepted Answers: TRUE.

6) Question 6. The set $S = \{(x_1, x_2) \in \mathbb{R}^2 | x_1 + x_2 \geq 9\}$ is a convex set. State TRUE or FALSE.
   No, the answer is incorrect. Score: 0.
   Accepted Answers: FALSE.

7) Question 7. Let $A = \{(x_1, x_2) \in \mathbb{R}^2 | x_1 + x_2 \geq 5\}$. Then $A$ is a
   - cone
   - half space.
   - hyperplane.
   - none of these.
   No, the answer is incorrect. Score: 0.
   Accepted Answers: half space.

8) Question 8. Let $S = \{(x_1, x_2) \in \mathbb{R}^2 | x_2 = [x_1]\}$. Then $S$ is a
   - cone
   - convex set.
   - half space.
   - none of these.
   No, the answer is incorrect. Score: 0.
   Accepted Answers: cone.

9) Question 9. Let $H_1$ and $H_2$ be two half spaces. Then $H_1 \cap H_2$ is convex. State TRUE or FALSE.
   No, the answer is incorrect. Score: 0.
   Accepted Answers: TRUE.

10) Question 10. Let $S$ be the collection of points $(1,0)^T, (2,0)^T, (0,1)^T, (2,1)^T$ in $\mathbb{R}^2$. Is $S$ a convex set? State TRUE or FALSE.
    No, the answer is incorrect. Score: 0.
    Accepted Answers: FALSE.

11) Question 11. Let $A = \begin{bmatrix} 1 & 1 \\ 1 & 4 \end{bmatrix}$, $S = \left[ \begin{bmatrix} 4 \\ 20 \end{bmatrix} \right]$. State TRUE or FALSE: $S = [x \in \mathbb{R}^2 | x \leq 1]$ is a polytope.
    No, the answer is incorrect. Score: 0.
    Accepted Answers: TRUE.

12) Question 12. State TRUE or FALSE: A polytope is a convex set.
    No, the answer is incorrect. Score: 0.
    Accepted Answers: TRUE.