

AE-777A (Optimal Space Flight Control)

Quiz No. 2

Quiz Procedure

1. Clearly write out your solution to the quiz problems within the specified time on blank sheets of paper. (Marks will be given only for complete calculation/derivation steps.)
2. Take low-resolution pictures of your solution, convert them into a single PDF file (about 1MB), and send it to me by email (ashtew@iitk.ac.in) from your registered email account.
3. The time limit will be strictly enforced, and late submissions will not be accepted.

Quiz No. 2 (Time 60 min)

(Marks for each problem are indicated in parentheses.)

1. For the following function:

$$L(u) = \frac{1}{3}u^3 + \frac{1}{2}u^2 + \frac{1}{4}u$$

where $u \in \mathbb{R}$, find the stationary points (if any) and determine if they are the minimum points.

(10)

2. Consider the following function:

$$L(u) = u_1^2 - 3u_1u_2 + 2u_2$$

where $u = (u_1, u_2)^T \in \mathbb{R}^2$, find the stationary points (if any) and determine if they are the minimum points.

(20)

3. For the minimization of

$$L(x, u) = \frac{1}{2}x^2 + \frac{1}{2}u^T \begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix} u$$

with respect to $u \in \mathbb{R}^2$, where $x \in \mathbb{R}$, subject to the constraint

$$f(x, u) = x + [2, -1]u + 2 = 0$$

find the stationary points, (x^*, u^*) , (if any).

(30)

Please send your solution to me (ashtew@iitk.ac.in) before 1:00 p.m. today.