

**Name:**

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A pendulum model with friction is given as follows:

$$\dot{x}_1(t) = x_2(t), \quad \dot{x}_2(t) = -10\sin(x_1(t)) - x_2(t) + u(t).$$

Find (a) the state-space representation of this nonlinear system, (b) the equilibrium point given that  $u_e = 0$ , and the (c) linearized representation of this nonlinear system.

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**Your Solution:**