THE UNIVERSITY OF TEXAS AT SAN ANTONIO
EE 5143
I INEAR SYSTEMS AND CONTROL

QUIZ # 1 Ahmad F. Taha August 28, 2017

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Answer the following questions:

1. The equilibrium of dynamical systems exist when the derivative of individual states is equal to zero. Assuming that α , β , δ and γ are all positive constants, find the equilibrium of the prey-predator model:

$$\dot{x}(t) = \alpha x(t) - \beta x(t)y(t)$$

$$\dot{y}(t) = \delta x(t)y(t) - \gamma y(t).$$

2. Find the transfer function Y(s)/R(s) for the following active suspension system, given that the initial conditions are all zero.

$$m_1 \ddot{x}(t) = k_s(y(t) - x(t)) + b(\dot{y}(t) - \dot{x}(t)) - k_w(x(t) - r(t))$$

$$m_2 \ddot{y}(t) = -k_s(y(t) - x(t)) - b(\dot{y}(t) - \dot{x}(t))$$