Question 1

Consider the following circuit:

\[
\begin{align*}
V_{out} & \quad \text{as a function of } C_0, C_1, \text{ and } C_2. \text{ Show your derivation.} \\
\text{Assume: positive current flows from left to right.} \\
\text{Ohm’s Law gives us:}
\end{align*}
\]
\[
\begin{align*}
5C_0 - V_{out} & = 16RI_0 \\
5C_1 - V_{out} & = 4RI_1 \\
5C_2 - V_{out} & = RI_2
\end{align*}
\]
Kirkoff’s Law gives us:

\[ I_0 + I_1 + I_2 = 0 \]

Therefore:

\[ \frac{5C_0 - V_{out}}{16R} + \frac{5C_1 - V_{out}}{4R} + \frac{5C_2 - V_{out}}{R} = 0 \]

\[ 5(C_0 + 4C_1 + 16C_2) = (1 + 4 + 16)V_{out} \]

\[ \frac{5C_0 + 4C_1 + 16C_2}{1 + 4 + 16} = V_{out} \]

**Question 2**

Consider the FSM from the project:

![FSM Diagram]

Suppose we want our controller to do two additional things:

1. Land on command from hover 4.
2. Return to hover 1 from hover 3 if an imaging sensor detects a tank.
1. (10pts) What events, states, and actions must you add to this FSM?
   One new event: *tank*.
   Possibly another new event: *land_command*.

2. (10pts) Show the modified FSM.
Question 3

Consider the same FSM from the project (the original FSM, not the one you just modified).

Suppose we want our controller to do two additional things from hover 3:

1. Land on command (10)
2. Otherwise, rotate in place indefinitely

1. (10pts) What events, states, and actions must you add to this FSM?
   None.
2. (10pts) Show the modified FSM.