MEMS 0031 - Electrical Circuits
Quiz #1

Name: Solutions

Problem #1

Given $i(t)$=5·sin(3t) [A], determine the charge $q(t)$ for $t \geq 0$:

$$i = \frac{dq}{dt} \implies dq = i\,dt \implies q = \int_0^t i\,dt = \frac{5}{3}\Big(1 - \cos(3t)\Big)$$

Problem #2

Given $q(t)$=e^{-10t}, determine the current $i(t)$ for $t \geq 0$:

$$i = \frac{dq}{dt} = \frac{d}{dt}(e^{-10t}) = -10e^{-10t}$$

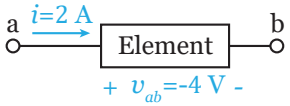
Problem #3

Given $i(t)$=$3t^3$ and $V(t)$=$3t^{-2}$, determine $P(t)$ for $t \geq 0$:

$$P(t) = V(t)i(t) = (3t^3)(3t^{-2}) = 9t$$

Problem #4

Given the schematic below, determined the power **supplied**:



The circuit depicted adheres to the PSC, however, the voltage potential across terminals a and b is negative. Switching the polarity of the voltage potential, the circuit then adheres to the ASC

$$P = Vi = (4\,[\text{V}])(2\,[\text{A}]) = 8\,[\text{W}]$$