Problem a. Consider the \( i - v \) curve of a PV array under a certain weather condition shown below.

\[ \begin{array}{c|c}
0 & 1 & 2 & 3 & 4 \\
0 & 4 & 3 & 2 & 1 \\
\end{array} \]

\( i \) [A] \hspace{1cm} \( v \) [V]

1. [30 points] **Determine** the maximum power operating point (current and voltage) of the array and the maximum power value.

On the \( i-v \) curve of the PV array, we see that the current is constant up to 10V, and then it starts to decrease. So \( P = VI \) is maximized when \( V \) is maximized and \( VI \) has not yet started to drop.

\[ \begin{align*}
I &= \boxed{4A} \\
V &= \boxed{10V} \\
\end{align*} \]

\[ P_{\text{max}} = 4A \times 10V = \boxed{40W} \]
2. **[20 points]** Sketch the power curve for this array, with the voltage on the horizontal axis and power on the vertical axis. **Indicate** at least 4 points on this curve.

![Power Curve Diagram](image)

3. **[30 points]** Sketch the i-v curve of three of these PV arrays connected in parallel and **compute** the short-circuit current and the open-circuit voltage of these three PV arrays connected in parallel.

When the arrays are connected in parallel, the output current of the three arrays will add up, but the output voltage will remain the same.

![Current Output of Three Arrays in Parallel](image)

4. **[20 points]** Under this weather condition, **evaluate** the current and the voltage outputs of the array if we connect the array to a resistor $r = 2 \, \Omega$

When the resistor is connected to the array, the voltage and current relationships for source and load should match. That is, a particular set of current and voltage values should satisfy the array's i-v curve and the resistor's $V=IR$ relationship.

Since $R = 2 \, \Omega$, we need a current and voltage value on the array's i-v curve that matches it.

The only such point is $[V=8V, I=4A]$. 

![I-V Curve Diagram](image)