Problem 1. An array of six panels is now operating on Rogers roof. The I-V curve shown below represents a strong sun condition. What is the maximum power available for the sun condition shown? What value of load resistance will draw maximum power? (Hint – find the maximum power by checking individual points using $P = V \times I$.)

![Graph of Rogers Roof PV Array I-V Characteristics]

Max power output of PV is at $(114 \, V, 4.25 \, A) = 485 \, W$

Corresponding equation for right side is $V = I \times R$, $R = \frac{V}{I} = \frac{114 \, V}{4.25 \, A} = 26.8 \, \Omega$

So, attaching 26.8 $\Omega$ to the PV array satisfies the $V, I$ equations for PV and $R$, while also providing max power.

Intersection of PV and $R$ at max power point $(V, I)$.
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\[ P_{\text{max}} = (114\, \text{V})(4.65\,\text{A}) = 530\,\text{W} \]

\[ R_{\text{max}}^{\text{power}} = \frac{114\, \text{V}}{4.65\,\text{A}} = 24.5\,\Omega \]
Problem 1. An array of six panels is now operating on Rogers roof. The I-V curve shown below represents a strong sun condition. What is the maximum power available for the sun condition shown? What value of load resistance will draw maximum power? (Hint – find the maximum power by checking individual points using $P = V \times I$).

\[
\begin{align*}
P_{\text{max}} &= (10.3 \text{V})(4.4 \text{A}) = 45.3 \text{W} \\
R_{\text{max}} &= \frac{10.3 \text{V}}{4.4 \text{A}} = 2.34 \Omega 
\end{align*}
\]
Problem 2. Two pieces of basswood support rigid horizontal top and bottom aluminum plates. The basswood supports are connected via swivels and sleeves so there is no glue to break loose. Thus, any failures will be in the basswood itself, not at a joint.

The basswood has square cross section with side dimension = 0.25 inch. The yield strength is 5000 pounds per square inch. With $\Theta = 50$ degrees, a downward testing force is slowly applied at the top. How much downward testing force causes the basswood to yield? (Hint – examine the freebody diagram of either piece of basswood and find the compressive force on either end).

For $\Theta = 40^\circ$, $F_{\text{yield}} = 402.1$ lbs

For $\Theta = 60^\circ$, $F_{\text{yield}} = 541$ lbs

So, large $\Theta$ is stronger and will weigh less!