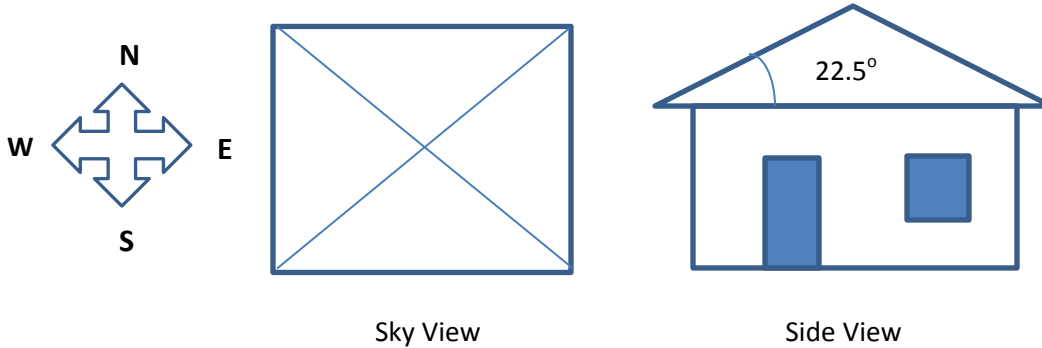


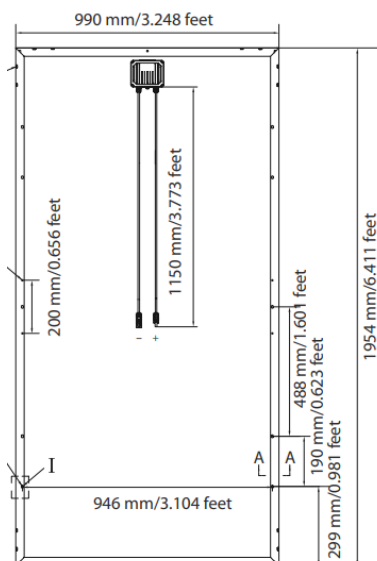
EE 446/646 (Take-home Portion of Test # 1)

Consider a PV array that consists of 12 AstroHalo 370 Wp PV modules whose dimensions and electrical characteristics under STC are shown below. The array is to be placed on the roof of a building in Las Vegas, NV. The roof is sloped at 22.5 degrees on each side, and $\frac{1}{4}$ of it faces south, $\frac{1}{4}$ faces north, $\frac{1}{4}$ faces east and $\frac{1}{4}$ faces north as shown in the figure below. Assume the array is free of any shading all year long, and ignore the effect of ambient temperature on array efficiency. Use local TMY3 data to answer the questions that follow.



- 1) Calculate the yearly electric energy (in MWh) that the PV array is expected to produce if it is placed on the south-facing portion of the roof.
- 2) Repeat 1) if it is placed on the north-facing portion of the roof.
- 3) Repeat 1) if it is placed on the east-facing portion of the roof.
- 4) Repeat 1) if it is placed on the west-facing portion of the roof.
- 5) Repeat 1) if $\frac{1}{2}$ of the array is placed on the east- and the other $\frac{1}{2}$ is placed on the west-facing portion of the roof.
- 6) Repeat 1) if $\frac{1}{2}$ of the array is placed on the south- and the other $\frac{1}{2}$ is placed on the north-facing portion of the roof.
- 7) Repeat 1) if $\frac{1}{4}$ of the array is placed on each of the 4 sides of the roof.

Plot your results on the same graph for comparison purposes.



ELECTRICAL SPECIFICATIONS

	350 Wp	355 Wp	360 Wp	365 Wp	370 Wp
STC rated output (P_{mpp})*	350 Wp	355 Wp	360 Wp	365 Wp	370 Wp
Rated voltage (V_{mpp}) at STC	38.58 V	38.82 V	39.14 V	39.38 V	39.66 V
Rated current (I_{mpp}) at STC	9.08 A	9.15 A	9.20 A	9.27 A	9.34 A
Open circuit voltage (V_{oc}) at STC	47.01 V	47.31 V	47.62 V	47.82 V	48.13 V
Short circuit current (I_{sc}) at STC	9.53 A	9.60 A	9.66 A	9.75 A	9.82 A
Module efficiency	18.1%	18.4%	18.6%	18.9%	19.1%

