**BRAE 470/471 Solar Photovoltaic System Engineering Fall 2015**

**HW Assignment 2**

1. We want to build a PV system on a roof with surface area 10*.* Consider the use of two possible PV panels:

a. A single crystal Si PV panel with efficiency *η*=20% and cost of $1.00/*W*.

b. A polycrystalline Si PV panel with efficiency *η*=15% and cost of $0.05/*Wp*.

The total non-module costs are $100/*.*

In each case, what is the total cost of installation of the system?

2. The system is installed on the roof of a building in San Luis Obispo oriented due South at a 22 degree elevation angle. There are no optical obstructions. Use online sources to estimate the annual average insolation for San Luis Obispo.

a. What do you expect the annual total energy production of this system to be *for each of the panel types above?*

b. Compare this with the typical power consumption of a single-family residence in this area (use utility data, also found online).

3. Dr. Hall will be distributing a new interactive spreadsheet specifically for our SunPower E20 panels, that consider all of the internal PN junctions in series. Using this spreadsheet, calculate the peak power point (Voltage, Current and Power output) for this panel when subject to 500 W/**irradiance.

4. Identify and describe the differences between the two types of PV panels that currently dominate the consumer solar market (reference Dr. Hall’s lecture).