## ECE 320 - Homework \#3

LEDs, Clipper Circuits. Due Monday, September 12th

LEDs: The specifications for a Piranah RGB LED are: (\$0.21 ea)


|  | Vf @ 20mA | mcd @ <br> 20 mA | Wavelength | DC Current <br> avg | DC Current <br> Peak |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Red | 2.0 V | 8,000 | 620 nm | 30 mA | 120 mA |
| Green | 3.2 V | 8,000 | 515 nm | 30 mA | 120 mA |
| Blue | 3.2 V | 8,000 | 460 nm | 30 mA | 120 mA |

1) Design a circuit which outputs pink:

- Red $=7800 \mathrm{mcd}$, Green $=6150 \mathrm{mcd}$, Blue $=6440 \mathrm{mcd}$

2) Assume a scoreboard used these LEDs in a $320 \times 200$ array. How much current would the entire scoreboard take if it output white light ( 20 mA for each color (RGB) for each LED)?
3) A 6W LED ceiling light has the following specifications: (\$4.30 ea)


| Dia | $\mathrm{Vf} @$ <br> 600 mA | Lumens @ <br> 600 mA | Color | DC Current <br> avg | DC Current <br> Peak |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $4 "$ | 10.0 V | 480 | Warm White | 600 mA | 2 A |

3a) Design a circuit which drives this LED light at 100 mA .
3b) How many lumens this light output at 100 mA ?

## Clipper Circuit:

4) Design a clipper circuit which approximates the function $\mathrm{Y}=2 * \ln (\mathrm{X})$
5) Check your design in PartSim (hint: determine the output voltage at several points)
6) Lab: Build this circuit and check the I/O relationship in lab.


$$
Y=2 * \ln (X)
$$

