

**Math 155B — Computer Graphics — Spring 2020**  
**Homework #1 — Due Monday, April 6, 10:00pm**  
Hand in via Gradescope — Use separate pages for each problem.

1. The function *linear-to-sRGB* defined in Equation (VII.3) in the textbook (revision B.1.h),

$$\textit{linear-to-sRGB}(x) = \begin{cases} 12.92x & \text{if } 0 \leq x < 0.0031308 \\ 1.055x^{1/2.4} - 0.055 & \text{if } 0.0031308 \leq x \leq 1. \end{cases}$$

was claimed to be continuous at  $x = 0.0031308$ . If you check this, this is *almost* true. How big is the discontinuous jump at  $x = 0.0031308$ ? The function was also claimed to have only a small discontinuity at the value. How big is the discontinuity?

2. A footnote on page 239 of the textbook states that using 16 bit color values in the linear RGB representations gives sufficient precision for perceived colors, even for dark colors. Do a calculation to confirm this. What is *sRGB-to-linear*(1/255)? How many bits of precision are needed to specify a value this small? Is 16 bits enough?
3. The gamma function  $x^{1/2.2}$  is generally replaced with the function *linear-to-sRGB*. The reason given for this is that it avoids having an undefined (infinite) derivative at  $x = 0$ . Speculate about why it would be important to not have an infinite derivative at  $x = 0$ . (It is OK, even encouraged, to try googling about this, or discussing it on piazza.)
4. Acknowledgement of assistance. (This can both give you “engagement” credits and let your instructor and TA have a better idea of how well the homework assignments are going.) Did you use any outside resources to help with this assignment, such as books, websites, videos, articles, etc.? List online items by URL. You only need to list ones that ended up being useful. Did you assist other students in the class outside of public piazza posts? Did you receive assistance from other students or other people? Please list other students by name. You may also cite assistance from piazza posts or other course materials. Please be succinct but specific in your reply.

Re: Acknowledgement of assistance/academic integrity. (1) Your first step should always be to try to understand and work the problem on you own. After that you can seek help elsewhere as needed. (2) You are responsible for your final answer, understanding why it is correct and how it was arrived at. You are not supposed to just copy someone else’s answer.