CSI 35, Homework 7 on section 5.4

Due by Mon, Oct 31.

Here are five questions for you to try. Write all your working out and answers on your own notepaper - no need to write the questions. Please use lots of space.

It is very important that you show clearly any work you had to do to get your answers. Just writing the answer down with no work shown is usually not enough.

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(1) Trace through the recursive procedure *factorial*(n) from the notes when it is given $n = 5$ as input. Show every step the procedure uses to find $5!$. How many times does the procedure call itself?

(2) Remember that $x \bmod y$ means the remainder when you divide x by y.

(a) Why is $210 \bmod 5 = 0$?

(b) Use long division to find $397 \bmod 7$.

(3) Trace through the recursive procedure *gcd*(a, b) from the notes (the Euclidean algorithm) when it is given $a = 91$, $b = 119$ as input. Show every step and give the final answer.

(4) For any n can you work out what this recursive procedure outputs?

procedure fun(n : nonnegative integers)

if $n = 0$ **then return** 5

else return $3 \cdot$fun($n - 1$)

(5) Trace through the recursive procedure *mergesort*(L) from the notes when

$$L = 6, 2, 4, 9, 1.$$

Show each step in detail and give the final output.
