CS 173: Discrete Mathematical Structures, Spring 2008
Homework 0

Due *in class* on Thursday, January 17, 2008

Submit your solutions for this homework *in class* on Thursday, January 17. Please make sure to read the course policies on homework *before* writing up your homework.

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1. Simplify the following expressions as much as possible, **without using an calculator (either hardware or software)**. Do not approximate. Express all rational numbers as improper fractions.

   (a) $12/8$ (b) $\frac{7}{3} + \frac{3}{7}$ (c) $\sqrt{\pi^{1234}}$

   (d) $2^{10000} \bmod 3$ (e) $\frac{\ln 256}{\ln 2}$ (f) $\log_2 8^c$

   (g) $(\log_2 13)(\log_2 5)$ (h) $(x^{x+2} + 2)^2$ (i) $\frac{\beta^3 + 1}{\beta^2 - \beta + 1}$

   (j) $\log_2 13 + \log_2 5$ (k) $\sum_{r=1}^{\ell} 2^r$ (l) $\prod_{\ell=1}^{r} 2^\ell$

2. Suppose $F(x) = x^2 - 3x + 2$ and $G(y) = y + 10$.

   (a) What is $F(a)$?

   (b) What is $F(G(z))$?

   (c) What is $G(G(G(G(G(10)))))$?

   (d) What is $F(1) * (F(G(\sqrt{\pi})) + G(F(\sqrt{\pi})))$? Do not use a calculator.

   (e) Let $P(x)$ be the sentence "All I want for Christmas is my x front teeth.". Write the sentence $P(F(4))$ in colloquial English (no formulas).

3. While working on your homework in Siebel late one night, you come across Erin and Kevin, who offer to help you with your homework. However, you are not sure if they will tell you the truth or mislead you. Kevin tells you, "Erin is lying". Erin says, "We are both telling the truth". Who, if anyone, is telling the truth? Provide an argument or truth table to show your reasoning.