Choose 10 of the following problems. You may choose to do more than 10 in which case these extra problems may replace any of your 10 chosen problem at $4 / 5$ the value if this improves your exam grade. You may also earn 1-2 bonus points for correctly doing more than 10 problems.
5. Evaluate $N\left(\frac{4}{9}+\frac{-10}{3}\right)$
6. Given: $\quad \begin{aligned} t & =g_{1} \bmod h_{1} \\ t & =g_{2} \bmod h_{2}\end{aligned} \quad$ When can you use the Chinese Remainder Theorem?
7. When are solutions of tangle equations useful?
a. When applied to topoisomerase.
b. When applied to recombinases.
c. When applied to pure math research.
d. All of the above.
8. Define knot invariant.
9. Currently, the invariant names are linked to Wiki pages, but eventually they will be modified to link to what?
10. The database itself is just a simple text file, true or false? Will its format eventually change? Why?
11. Draw the Seifert surface for the knots $3_{1}$ and $5_{2}$. Draw a non-orientable surface whose boundary is the knot $3_{1}$.
12. Calculate the Alexander polynomial of the $\operatorname{knot} 4_{1}$.
13. Create a projection of a knot that has Dowker notation $<4682>$. (Hint: remember to keep the knot alternating).
14. Use continued fractions to prove whether or not the following pairs of tangles are equivalent. Are their numerator closures equivalent? Explain.

