1. [5] About primes, GCDs, and LCMs. (Show a little bit of work on each part so I know you’re not just guessing.)

   a. [2] What is the prime factorization of 9100?

   9100 is 91 times 100. 100 has the prime factorization $2^2 \cdot 5^2$, and 91 has the prime factorization $7 \cdot 13$. So 9100 has the prime factorization $2^2 \cdot 5^2 \cdot 7 \cdot 13$.

   b. [1.5] What is the greatest common divisor of 32 and 100?

   Since 32 has the prime factorization $32 = 2^5$ while 100 has the prime factorization $2^2 \cdot 5^2$, therefore their GCD is $2^2 = 4$.

   c. [1.5] What is the least common multiple of 32 and 100?

   Since 32 has the prime factorization $32 = 2^5$ while 100 has the prime factorization $2^2 \cdot 5^2$, therefore their LCM is $2^5 \cdot 5^2 = 800$. You can also find it as $\text{lcm} = \frac{32 \cdot 100}{4}$.

2. [3] List the following functions in increasing order of growth so that the slowest growing function comes first, and the fastest growing function last.

   $$x, \ 2^x, \ \log x, \ x^2, \ x(\log x)^2, \ x^x, \ \log(\log x)$$

   $$\log(\log x) \prec \log x \prec x \prec x(\log x)^2 \prec x^2 \prec 2^x \prec x^x$$

3. [2] Find the smallest value of $n$ so that $(4x^2 + 3x + 1)^3$ is $O(x^n)$. Explain how you found $n$ in a sentence or two. (You don’t have to prove it or find $C$ or $k$.)

   Since $4x^2 + 3x + 1$ is $O(x^2)$, its cube is $O(x^6)$. 