1. f(x) = $(x^{2.3}$+ x ln $x^5)$ $(1.1^{x+1} + 1.2^x)$ + $(x^2 + 1.2^x)$ $(x^3 + .92^x)$
   → O($x^{2.3}$+ 5x ln x) = O($x^{2.3}$)
   → O($1.1^{x+1} + 1.2^x$) = O(1.2^x)
   →O($x^2 + 1.2^x$) = O(1.2^x)
   →O($x^3 + .92^x$) = O(x^3)

   O($x^{2.3}$) * O(1.2^x) + O(1.2^x) * O($.92^x$)
   O($x^{2.3}$ * 1.2^x) = g(x)

2. **No.**
   Consider x = 6:
   $\frac{x^2 6^x}{6^x}$ = x^2, which cannot be upper bound by any constant k. Therefore $x^2 6^x$ is not O(6^x)
   Now consider x > 6:
   $\lim_{x\to\infty}\left(\frac{x^2 6^x}{a^x}\right)$ = 0, which shows there is an upper bound by some constant k. Therefore $x^2 6^x$ is in O(6^x).
   However, There are infinite real numbers such that a > 6, therefore there is no smallest real number that places $x^2 6^x$ in O(6^x).

3. $CA10_{16}$ + $4F57_{16}$:
   7 + 0 = 7
   5 + 1 = 6
   A + F = 19 Carry the 1 to the next line
   1 + C + 4 = 11

   $CA10_{16}$ + $4F57_{16}$ = **11967_{16}**

4. 11011_2 * 1001_2: (x is placeholder)
   xxx11011
   xx000000
   x0000000
   <u>11011000</u>
   11110011 ANSWER

5. 621 = 82 * 7 + 47
   82 = 47 * 1 + 35
   47 = 35 * 1 + 12
   35 = 12 * 2 + 11
   12 = 11 * 1 + 1
   11 = 1 * 11 + 0

   The last nonzero remainder is 1, so by the Euclidean Algorithm, the integers **621 and 82 are relatively prime.**

6. $n * 35 = 32n + 3n$
   $= 2^5n + 3n$
   $= 2^5n + 2n + n$

   Mem $= 2^5n + 2n$

   Result = Mem + $\boldsymbol{n}$

7. Just like multiplying a decimal number by 10_{10}, when multiplying an octal number by 10_8 (8_{10}) you simply add a zero to the right side of the number like a bit-shift. In the instance of n = 741_8 ,

   n * $\mathbf{10_8}$ = $\mathbf{7410_8}$

8. The division in this case is the opposite direction of shift of multiplication, perform the "bit-shift" when dividing with powers of 10_b. The cut bit becomes the remainder. In the instance of n = 741_8,

   $\frac{\mathbf{741_8}}{\mathbf{10_8}}$ **= 74 with a remainder of 1.**

9. n = 0 : $3^{2^0} = 3^1$ = 3 mod(13)
   n = 1 : $3^{2^1} = 3^2$ = 9 mod(13)
   n = 2 : $3^{2^2} = 3^4$ = 81 mod(13)

   If n is odd then : 3^{2^n} = 9 mod(13)
   If n is even then : 3^{2^n} = 3 mod(13)

10. Calculating hex numbers A…A requires a geometric summation. This can be defined by:

    In Hex:
    $\sum_0^n 0xA * \ 0x10^n$ = 0xA $\sum_0^n 0x10^n$
    In Decimal:
    $\sum_0^n 10 * 16^n$ = 10 $\sum_0^n 16^n$

    This simplifies by the Geometric Sum Formula to:
    $10\frac{16^n-1}{16-1} = 10\frac{16^n-1}{15} = \mathbf{2\frac{16^n-1}{3}}$

11. EXTRA CREDIT: