Question	Solution
0.	Multiply both sides of the equation by 3 to obtain $3(3x+4)=9x+12=3(6)=\mathbf{18}$.
1.	There are 2013 terms in the series. Since addition and subtraction is associative, the series is equal to $(1-2)+(3-4)+\cdots+(2011-2012)+2013$, or $-1-1-1-\cdots+2013$. There are $\frac{2012}{2}=1006$ copies of -1, making the sum $-1006+2013=\mathbf{1007}$.
2.	Since $\frac{.25+.652}{2}=.451$, the answer is $4+5+1=\mathbf{10}$.
3.	Divide both sides of the equation by e^2 to obtain $e^{2x}-e^x=20$, or after some factoring, $(e^x-5)(e^x+4)=0$. This means that $e^x=5$ or $e^x=-4$. Since x is real, the exponential cannot be negative, making the sum equal to **5**.
4.	The exterior angle of the nonagon is $360°/9=40°$. Notice that since triangle GHI is isosceles, angles GIH and HGI are congruent, and by the Exterior Angle Theorem, add up to $40°$. Therefore, the measure of angle GIH is $40°/2=\mathbf{20}°$.
5.	The sum of the roots of f is 14. Since a and b are prime, the only possible values are 3 and 11. Thus, $a^3+b^3=3^3+11^3=27+1331=\mathbf{1358}$.
6.	Straightforward calculation. The determinant is $(46)(76)-(2)(-34)=\mathbf{3564}$.
7.	Experiment with multiples of Pythagorean Triples, and see that the desired triangle is a multiple of the 5-12-13 triple, specifically, the 20-48-52 triangle. The perimeter is **120**.
8.	In order for a number to be divisible by 4, the last two digits have to be a multiple of 4. There are $(5)(4)=20$ possibilities for the last two digits, two of which—48 and 84—are multiples of 4. The probability is $2/20=\mathbf{1/10}$.

9.	Since $2500^n = 2^{2n} \times 5^{4n}$, we are only interested in the exponents of 2 and 5 in the prime factorization of 2013!. The exponent of 5 will be significantly less than the exponent of 2 in the factorization, so that will be the "limiting factor" in our search for the largest n. We find the exponent of 5 in the factorization as follows: $$\left\lfloor \frac{2013}{5} \right\rfloor + \left\lfloor \frac{2013}{25} \right\rfloor + \left\lfloor \frac{2013}{125} \right\rfloor + \cdots = 501$$ So $4n \leq 501$, making $\mathbf{125}$ the largest value for n.
10.	Write out the product, use change-of-base, and observe that the terms cancel: $$\frac{\ln 3}{\ln 2} \times \frac{\ln 4}{\ln 3} \times \dots \frac{\ln n}{\ln(n-1)} \times \frac{\ln(n+1)}{\ln n} = \frac{\ln(n+1)}{\ln 2} = \log_2(n+1)$$ If $\log_2(n+1) = 2013$, then $n = 2^{2013} - 1$, which, when converted to binary, is simply a string of 2013 1s. Thus, $D(n) = \mathbf{2013}$.
11.	Take natural logs of both sides to obtain $(x^2 + x - 12)\ln 2 = (x^2 - 5x + 6)\ln 3$, or after factoring, $(x+4)(x-3)\ln 2 = (x-3)(x-2)\ln 3$. By inspection, $x = \mathbf{3}$ is a solution, and really, the only integer solution because after cancellation, the resulting equation is $(x+4)\ln 2 = (x-2)\ln 3$, which does not have solutions if x is an integer.
12.	Let $x = 1$ in the functional equation. We have $f\big(f(1)\big) = f(3) - 3$, or $f(4) = f(3) - 3$, so that $f(3) = f(4) + 3 = 3 + 3 = 6$. Next, let $x = 4$ in the functional equation to obtain $f\big(f(4)\big) = f(6) - 3$, or $f(3) = f(6) - 3$, so that $f(6) = f(3) + 3 = 6 + 3 = 9$. Finally, let $x = 3$ in the functional equation to obtain $f\big(f(3)\big) = f(5) - 3$, or $f(6) = f(5) - 3$, so that $f(5) = f(6) + 3 = 9 + 3 = \mathbf{12}$.