1. **Answer: 1681**

   There are 41 words in the problem statement. Since 41 is itself a prime, the answer is $41^2 = 1681$.

2. **Answer:** $\frac{\mathbf{100}}{\boldsymbol{x-1}}$**%**

   After yesterday, the fraction of the initial gold remaining is $1-\frac{1}{x}=\frac{x-1}{x}$. Therefore, in order to to reach the original amount of gold, we must multiply by $\frac{x}{x-1}=1+\frac{1}{x-1}$. Thus, the gold must be increased by $\frac{100}{x-1}$ percent.

3. **Answer: $(5, 0), (4, 1), (1, -2)$, and $(2, -3)$**

   We factor the expression as follows:

$$ab + a - 3b - 3 = 5 - 3$$
$$(a-3)(b+1) = 2$$

   We can use a table to find appropriate values for a and b.
   Thus, $(5, 0), (4, 1), (1, -2)$, and $(2, -3)$ are the desired solutions.

$a-3$	$b+1$	a	b
2	1	5	0
-2	-1	1	-2
1	2	4	1
-1	-2	2	3

4. **Answer: $x = 1$**

$$\begin{aligned} f(x) + xf\left(\frac{1}{x}\right) &= x \\ f\left(\frac{1}{x}\right) + \frac{1}{x}f(x) &= \frac{1}{x} \\ f\left(\frac{1}{x}\right) &= \frac{1}{x} - \frac{1}{x}f(x) \\ f(x) + x\left(\frac{1}{x} - \frac{1}{x}f(x)\right) &= x \\ x &= 1 \end{aligned}$$

5. **Answer:** $-\frac{\mathbf{5}}{\mathbf{4}}$

   We complete the square:

$$\begin{aligned} 2x^2 + 2xy + 4y + 5y^2 - x &= (x^2 + 2xy + y^2) + (x^2 - x + \frac{1}{4}) + (4y^2 + 4y + 1) - (\frac{1}{4} + 1) \\ &= (x+y)^2 + (x - \frac{1}{2})^2 + (2y+1)^2 - \frac{5}{4} \end{aligned}$$

   Notice that $x = \frac{1}{2}$ and $y = -\frac{1}{2}$ would yield the minimum, which is $-\frac{5}{4}$.

6. **Answer: 506**

Let P_n be the value of the dollar in gold after the n^{th} bailout. Let $s = \frac{1}{2}$. Then after the n^{th} bailout, the dollar is a factor of $(1 + s^{2^{n-1}})$ of its $(n-1)^{th}$ value. Thus,

$$\begin{aligned} P_4 &= \frac{1}{980}(1+s)(1+s^2)(1+s^4)(1+s^8) \\ &= \frac{1}{980}(1+s+s^2+s^3)(1+s^4)(1+s^8) \\ &= \frac{1}{980}(1+s+s^2+s^3+s^4+s^5+s^6+s^7)(1+s^8) \\ &= \frac{1}{980}(1+s+s^2+s^3+s^4+s^5+s^6+s^7+s^8+s^9+s^{10}+s^{11}+s^{12}+s^{13}+s^{14}+s^{15}) \\ &= \frac{1}{980}\left(\frac{1-s^{16}}{1-s}\right). \end{aligned}$$

Plug in $s = \frac{1}{2}$, and we find that $P_4 = \frac{1}{490}\left(1 - \frac{1}{2^{16}}\right)$. So $b + c = 490 + 16 = 506$.

7. **Answer: 32670**

   Largest multiple of 60 below 2009 is 1980, so find the sum for $k = 1$ to 1979, so that we have each value of $\lfloor k/60 \rfloor$ exactly 60 times. This sum is therefore $60(1 + 2 + \ldots + 32) = 60(1 + 32)\frac{32}{22} = 31680$. The remaining terms are all 33, and there are $2009 - 1980 + 1 = 30$ of them, giving an answer of $31680 + 30 \times 33 = 32670$.

8. **Answer: $\bar{1}0\bar{1}1$**

   $(1\bar{1}00)(\bar{1}1) = \bar{1}1000 + 1\bar{1}00 = \bar{1}\bar{1}00$
   $\bar{1}\bar{1}00 + 1\bar{1}1 = \bar{1}0\bar{1}1$

9. **Answer: -58**

   Let the roots be r, s, and t. Then they satisfy $r + s + t = -a$, $rs + st + rt = b$, and $rst = -c$. So we have $-(a + b + c + 1) = r + s + t - rs - rt - st + rst - 1 = (r - 1)(s - 1)(t - 1) = 2009 = 7 * 7 * 41$.

   Thus the roots are 8, 8, and 42, and $a = -(r + s + t) = -58$.

10. **Answer: 20**

    For convenience, set $x = \sum_{n=1}^{\infty} \frac{\delta(n)}{n^2}$ and $y = \sum_{n=0}^{\infty} \frac{(-1)^{n-1}\delta(n)}{n^2}$.

    The crucial observation is that $\frac{1}{2}(x + y)$ and $\frac{1}{2}(x - y)$ give the same summation as x, restricted to the terms with odd n and even n respectively. The latter summation is easily related to x using the fact that $\delta(2n) = \delta(n)$ (since multiplying by 2 is simply appending a 0 in the binary expansion), as follows.

$$\begin{aligned} \frac{1}{2}(x-y) &= \sum_{\text{even } n \geq 2} \frac{\delta(n)}{n^2} \\ &= \sum_{n=1}^{\infty} \frac{\delta(2n)}{(2n)^2} \\ &= \sum_{n=1}^{\infty} \frac{\delta(n)}{4n^2} \\ &= \frac{1}{4}x. \end{aligned}$$

Thus we have $\frac{1}{2}(x - y) = \frac{1}{4}x$. It follows that $x = 2y$, so $x/y = 2$. Thus, the desired answer is 20.