Solutions:

Some Problems
Solutions for problems 1 to 4 can be found at
`http://www.cemc.uwaterloo.ca/contests/past_contests/2005/2005GaussSolution.pdf` (numbers 21 to 24).
Solution for problem 5 can be found at
`http://www.cemc.uwaterloo.ca/contests/past_contests/2008/2008GaussSolution.pdf` (number 25)

Practice Gauss Contest
Part A:

1. (B)

$$\begin{array}{r} 1.000 \\ 0.101 \\ 0.011 \\ +\ 0.001 \\ \hline 1.113 \end{array}$$

2. (C)

$$\begin{aligned} \tfrac{1}{2}+\tfrac{3}{4}-\tfrac{5}{8} &= \tfrac{4}{8}+\tfrac{6}{8}-\tfrac{5}{8} \\ &= \tfrac{4+6-5}{8} \\ &= \tfrac{5}{8} \end{aligned}$$

3. (B)

$$\begin{aligned} 800670 &= 800000+600+70 \\ &= 8\times 10^5+6\times 10^2+7\times 10^1 \\ \Rightarrow x+y+z &= 5+2+1 \\ &= 8 \end{aligned}$$

4. (E)
$x = 7 \times 12 + 5 = 89$

5. (D)
The angle that opposes 30°, is 30°, by the X pattern. Since the triangle is isoceles the final two angles within the triangle are equal. Hence, $180 = 2A + 30 \Rightarrow A = 75°$. Since the angles on a line sum to $180° \Rightarrow x = 105°$

6. (A)
Let x be the number. $2x + 13 = 89 \Rightarrow x = 38$

7. (D)
$-xy = -(-4)(4) = 16$

8. (C)
Let x be the number of chocolate chip cookies.
$\frac{2}{5} = \frac{x}{20} \Rightarrow x = 8$

9. (E)
There are $\frac{1}{3} \times 30 = 10$ girls $\Rightarrow$ 20 boys in the class. $75\% \times 20 = 15$ boys play basketball

10. (E)
Let x and y be the two positive integers. Possible values for x and y are:

x	y	$x+y$	xy
0	11	11	0
1	10	11	10
2	9	11	18
3	8	11	24
4	7	11	28
5	6	11	30

Part B:

11. (B)
If you are to increase the units digit, in order to keep the palindrom you would have to also increase the thousands unit. However if you instead increase the tens digit, you would have to also increase the hundreds digit, which is the smallest way to increase it, so the smallest number we can increase it by is 110.

12. (D)
$\sqrt{(36)} = 6, 5^2 = 25$, $35.19 < 35.2$ since $0.19 < 0.20$

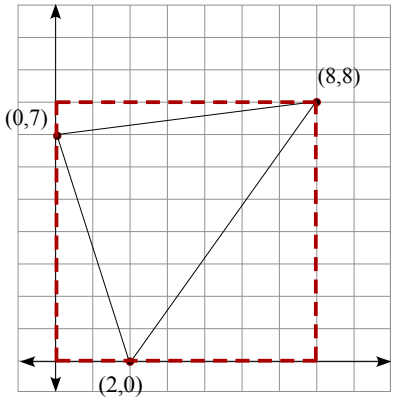
13. (E)
Subbing $c = 7$ into $b + c = 16 \Rightarrow b = 9$. Subbing $b = 9$ into $a + b = 12 \Rightarrow a = 3$

14. (C)
Largest square that can be inside the rectangle is 9 m by 9 m. If there is also a border 1.5 m wide around the square, the maximum size of the square is $(9 - 2(1.5))$ m by $(9 - 2(1.5))$ m
$\Rightarrow A = 6 \times 6 = 36$ m^2

15. (C)
$6 = 1 + 2 + 3$

16. (A)
$1 + \dfrac{1}{2} = \dfrac{3}{2}$
$1 + \dfrac{1}{\frac{3}{2}} = 1 + \dfrac{2}{3} = \dfrac{5}{3}$
$\dfrac{1}{\frac{5}{3}} = \dfrac{3}{5}$

17. (B)
$A_{\triangle ABC} = A_{\text{square}} -$ Three outer triangles
$A_{\triangle ABC} = 8^2 - \frac{1}{2}[2(7) + 6(8) + 1(8)]$
$A_{\triangle ABC} = 29$



18. (B)
If we remove 6 or 10, the range changes. If we remove 8 the mode would be either 7 or 8, as opposed to just 8. So we must remove either 7 or 9. Removing 9 will lower the mean. Therefore we must remove a 7.

19. (A)
Sol$^{\text{n}}$ 1:
B + A + T = 6 $\quad\Rightarrow\quad$ B = 6 − (A + T)

$C + A + T = 8 \quad \Rightarrow \quad C = 8 - (A + T)$
$C + A + R = 12 \quad \Rightarrow \quad C = 12 - (A + R)$ Equating C's:

$$\begin{aligned} 8 - (A + T) = 12 - (A + R) &\Rightarrow 2 + [6 - (A + T)] = 12 - (A + R) \\ &\Rightarrow 2 + B = 12 - (A + R) \\ &\Rightarrow B + A + R = 10 \end{aligned}$$

Sol^{n} 2:
Since BAT=6 and CAT=8 we know that Bs are worth 2 less than Cs. Therefore BAR will be worth 2 less than CAR. Since CAR=12, BAR=10.

20. (D)
$P = \frac{2}{5} \times \frac{1}{4} = \frac{1}{10}$

Part C:

21. (E)
The scale of the map is equal to the ratio of a distance on the map to the actual distance. Since the distance between Saint John and St John's is 21 cm on the map and 1050 km in reality, then the scale of the map is equal to

21 cm : 1050 km = 0.21 m : 1 050 000 m = 21 : 105 000 000 = 1 : 5 000 000

22. Solution of 22 from Gauss 8 2003 Contest:
`http://www.cemc.uwaterloo.ca/contests/past_contests/2003/2003Gauss8Solution.pdf`

23. Solution of 23 from Gauss 8 2003 Contest:
`http://www.cemc.uwaterloo.ca/contests/past_contests/2003/2003Gauss8Solution.pdf`

24. Solution of 24 from Gauss 8 2001 Contest:
`http://www.cemc.uwaterloo.ca/contests/past_contests/2001/2001Gauss8Solution.pdf`

25. Solution of 25 from Gauss 8 2004 Contest:
`http://www.cemc.uwaterloo.ca/contests/past_contests/2004/2004Gauss8Solution.pdf`

For more contest and solutions visit:
`http://www.cemc.uwaterloo.ca/contests/past_contests.html`