Answers to Statistics Problems

2. ±0.5, 17%; ±0.5, 5.6%

3. (a) 987.1±1.2 (b) 4321.7890±0.0008 [or 4321.7890(8)]
(c) 66.12±0.06 [or 66.12(6)]

4. 1.235×10^{7} (b) 1.200×10^{5} (c) 1.000×10^{-3}
(d) 5.900×10^{5}

5. (a) need 3 more digits in number to be compatible with error.
(b) need another digit in error; but as given, 789±3
(c) O.K.

6. (a) 123 (b) 9.9×10^{2} (c) 473

7. (a) 2.0568(41) cm (b) 389.0(8) K (c) $1.2134(24)\times10^{3}$ Torr

8. (a) Sub $x_i' = x_i + 10$ in Eqs. (1) and (3) *mean'* = *mean* + 10; variance and st. dev. unchanged.
(b) Sub $x_i' = x_i \times 1.1$ in Eqs. (1) and (3) mean and st. dev higher by 10%, variance higher by factor $1.1^2 = 1.21$.

9. $\Sigma\, \delta_{yi}^2$, where $\delta_{yi} = (y_{i,\mathrm{obs}} - y_{i,\mathrm{calc}})$; this is Chisq for an unweighted fit.

10. variance = 4.68188; st. dev. = 2.16376.

11. (a) $s_z = s_y/y$ (b) $s_z = s_y/x$

12. (bi) $s_z = 2s_x$ (bii&biii) $s_z^2 = s_x^2 + s_y^2$ (biv) $s_z^2 = 4s_x^2 + 9s_y^2$

13. (b) $(s_z/z)^2 = k^2(s_v/v)^2 + l^2(s_x/x)^2 + m^2(s_y/y)^2$
(d) (i) 1.0% (ii) 2.0% (iii) 0.5% (iv) $\sqrt{5}$ % (v) $\sqrt{5}$ %

14. FALSE!

16. (a) 500.0±3.3 (3.331) (b) 75.0±1.7 (1.73) (c) 100.0(8) (0.788)
(d) 108.0±3.6 (3.601)

17. (a) $z = \ln(a) - bx$ (b) $w_i \quad s_{zi}^{-2} = (y_i/s_{yi})^2$ (c-i) 0.01521
(c-ii) 0.009037 (c-iii) 12.754(15)
[See CP p 21, Eq. (9) and explanation.]

18. (a) $X_i = x_i^2$; $Y_i = x_i y_i$. (b) $w_i \quad 1/x_i^2$.

21. 0.60279 [Start Hint: Sketch the normal curve with desired area shaded.]

22. Counting involves Poisson statistics, for which $\sigma = \mu^{1/2}$. We take count ~ μ.

24. (a) $^3/_2$ (b) 0 (c) 0 (d) 0.6, 0.7746 (e) 0.0665

25. μ ~ 0; σ ~ $\sqrt{0.03}$; Prob. dist ~ normal.

26. (a-i) 0.6769 (a-ii) 0.2113 (a-iii) 0.03723 (b) 0.1330