Canon Maranda

Error Analysis Drill

Adapted from "Error Analysis Summary" by Mike Moloney

Exercises: Calculate $f \pm s_f$ in each case. The answers are given at the right. Please have the instructor check your work before you leave.

1. $f = 6x,\ x = 3.60 \pm 0.15$ (21.6 ± 0.9)

   $6(3.6) = 21.6$

   $6(.15) = .9$

   $(21.6 \pm .9)$

2. $f = 3x + y,\ x = 2.1 \pm 0.2,\ y = 4.3 \pm 0.3$ (10.6 ± 0.7)

   $3(2.1) + 4.3 = 10.6$

   $\sqrt{(3 \cdot .2)^2 + .3^2} = .7$

   $(10.6 \pm .7)$

3. $f = x + y + 2z,\ x = 1.7 \pm 0.1,\ y = 1.3 \pm 0.2,\ z = 2.4 \pm 0.2$ (7.8 ± 0.5)

   $1.7 + 1.3 + 2(2.4) = 7.8$

   $\sqrt{.1^2 + .2^2 + (2 \cdot .2)^2} = .5$

   $7.8 \pm .5$

4. $f = xy,\ x = 1.7 \pm 0.4,\ y = 2.8 \pm 0.2$ (4.8 ± 1.2)

   $1.7(2.8) = 4.8$

   $\sqrt{(1.7 \cdot .2)^2 + (2.8 \cdot .4)^2} = 1.2$

   4.8 ± 1.2

5. $f = \sqrt{x},\ x = 3.1 \pm 0.3$ (1.8 ± 0.1)

   $\sqrt{3.1} = 1.8$

   $\frac{.3\sqrt{.5}}{2} = .1$

   $1.8 \pm .1$

6. $f = x^3 + 2y,\ x = 2.3 \pm 0.1,\ y = 3.4 \pm 0.2$ (19.0 ± 1.6)

   $(2.3)^2 + 2(3.4) = 19$

   $\sqrt{9(.1)^2(2.3)^4 + 4(.2)} = 1.6$

   19 ± 1.6