# Additions to Second Edition Errata and Comments

May 8, 2002

We again thank Dick Palas for his many contributions.

**Page 297** Third line: "variables in terms," not "variables terms."

**Page 319** Example 3.2.5 refers to Example 3.1.11, but that example concerned a different function. Example 3.2.5 has been rewritten to show that $X_c$ is a smooth curve for all $c$:

> The locus $X_c$ defined by $x^9 + 2x^3 + y + y^5 = c$ is a smooth curve for all values of $c$ since the derivative of the function $F\begin{pmatrix} x \\ y \end{pmatrix} = x^9 + 2x^3 + y + y^5$ is
>
> $$\left[\mathbf{D}F\begin{pmatrix} x \\ y \end{pmatrix}\right] = [9x^8 + 6x^2\,,\, 1 + 5y^4],$$
>
> and $1 + 5y^4$ is never 0.

**Page 325** In the first line after Equation 3.3.10, the reference should be to Equation 3.3.9 and footnote 7.

**Page 326** First line after Equation 3.3.16: "There are 30 such terms" refers to terms *other* than the five terms in Equation 3.3.16. Thus there are 35 in all.

**Page 340** Equation 3.4.17 should include $= 0$:

$$F\begin{pmatrix} x \\ y \end{pmatrix} = x^3 + xy + y^3 - 3 = 0.$$

**Page 347** Margin note beginning "Definition 3.5.9 is equivalent": Exercise 3.5.7 concerns only positive definite quadratic forms.

The last margin note, about $Q(p)$, should be on page 343.

**Page 356** Last margin note: This is true for a quadratic form on $\mathbb{R}^n$.

**Page 357** First margin note: This is true for a quadratic form on $\mathbb{R}^n$.

**Page 362** There should be a $\triangle$ to mark the end of Example 3.7.3.

**Page 365** The $\triangle$ at the end of the caption should be on the next page, at the end of the example.

**Page 367** Margin note immediately after the figure caption: "manifold," not "manifolds."

**Page 370** There should be a △ to mark the end of Example 3.7.11.

**Page 378** Equation 3.8.5: $g(X)$, not $g(x)$.

**Page 379** Example 3.8.3, next to last line: the curvature $\frac{2}{5\sqrt{5}}$ is $\approx 0.179$, not $\approx 0.896$. (We had put the $\sqrt{5}$ in the numerator.) We have redone Figure 3.8.2.

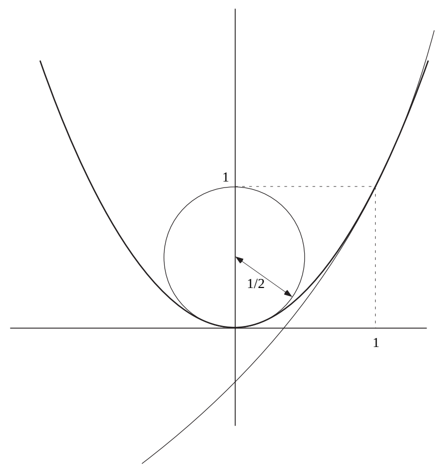


FIGURE 3.8.2. At $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$, which corresponds to $a = 1$, the parabola given by $y = x^2$ looks much flatter than the unit circle. Instead, it resembles a circle of radius $5\sqrt{5}/2 \approx 5.59$. (A portion of such a circle is shown. Note that it crosses the parabola. This is the usual case, occurring when, in adapted coordinates, the cubic terms of the Taylor polynomial of the difference between the circle and the parabola are nonzero.) At the origin, which corresponds to $a = 0$, it has curvature 2 and resembles the circle of radius 1/2, which also has curvature 2. "Resembles" is an understatement. At the origin, the Taylor polynomial of the difference between the circle and the parabola starts with fourth-degree terms.

**Page 387** Equation 3.8.42: The numerator should be $H(a^2 - b^2)$, not $H(b^2 - a^2)$.

**Page 394** In the hint for Exercise 3.8.11, we neglected to define $SO(3)$. It is the space of orthogonal $3 \times 3$ matrices with determinant $+1$. (Recall that an orthogonal $n \times n$ matrix is a matrix whose columns form an orthonormal basis of $\mathbb{R}^n$.)

**Page 398** Exercise 3.21, part (a): $2d \cos \varphi$ should be $2ad \cos \varphi$:

$$a^2 + d^2 - 2ad \cos \varphi \;=\; b^2 + c^2 - 2bc \cos \psi.$$

**Additions to index:**