Errata and Corrections for the text
Modern Geometry with Applications
by George Jennings

I thank the many generous readers who have taken time to sent in corrections!

Please send any additional corrections by email to gjennings@csudh.edu, or by surface mail to George Jennings, Mathematics Dept., California State University Dominguez Hills, 1000 East Victoria St., Carson, CA 90747

Corrections for the first and second printings.

The following corrections apply to the second printing (1996) of the book. Most of them apply to the first printing also, except in a few cases the the page numbers may be slightly different. Corrections that only apply to the first printing (1994) are listed at the end.

Exercise 1.3.2a, p. 4. Actually the question of whether or not the circles intersect depends on three inequalities. If A and B are the centers of the circles and the circles intersect at a point P then distances between pairs of points must satisfy all three versions of the "triangle inequality"

$$AB \leq AP + BP \quad \text{and} \quad AP \leq AB + PB \quad \text{and} \quad BP \leq BA + PA$$

Thanks, Mr. Ben Mellor of Aberdeen, Scotland, for pointing out this error.

Sect. 1.4, p. 5. First sentence, second paragraph. Replace "three spheres with centers" with "three spheres with noncollinear centers".

Sect. 1.7, Fig. 1.17, p. 13. The line M_2 at the 8 o'clock position should be labeled M_2''.

Sect. 1.9, Exercise 1.9.12 b. The problem should stipulate that $\angle A$, $\angle B$, and $\angle C$ do not exceed $90°$. The intersection of the three spheres is empty if one of the angles of the triangle is obtuse.

Sect. 1.10, p. 38. Paragraph starting with "f maps". Replace "pointing in in" with "pointing in".

Sect. 1.11, p. 41. Paragraph starting with "As the wheel", second line. Replace "distance distances" with "distances".

Sect. 2.5, p. 56. Paragraph starting with "$\vec{A}^*$ is perpendicular". In the second sentence "Likewise ...", replace $\vec{B}$ with $\vec{B}^*$ and $\vec{C}$ with $\vec{C}^*$.

Sect. 2.5, Proof of Prop 2.5.1 p. 57. In the denominators replace $\sin \angle a$, with $R \sin \angle a$, $\sin \angle b$ with $R \sin \angle b$, and $\sin \angle c$ with $R \sin \angle c$.

Sect. 2.6, Example 2.6.2 p. 61. There is a missing square root in formula for OA near the bottom of the page. It should say

$$OA \approx \frac{1 \text{ in.}}{\sqrt{2-(2)(.74536)}} \approx 1.401 \text{ in.}$$

Sect 2.7, Proof of Prop. 2.7.1, bottom of p. 62. In the numerator of the second term on the second line of the string of equalities, replace $\sin a^*$ with $R \sin \angle a^*$.

Sect. 2.8, p. 63. In the paragraph starting "The *latitude* of a point ..." replace "through through" with "through".

Sect. 2.8, Exercise 2.8.2 p. 65. Replace "N.J." with "Va."

Sect 2.9, top of p. 70. Replace "the the" with "the".

Sect. 3.1, Fig. 3.3. p. 85. The bottom left figure ("two lines") should be labeled "degenerate hyperbolic" and the bottom center figure ("one tangent line") should be labeled "degenerate parabolic".

Sect. 3.6, Exercise 3.6.3, p. 99 . The equation of the directrix should be $x = -d$ not $x = d$.

Sect. 3.8, pp. 102 . First paragraph, after the word "Newton's" Add footnote: "See [Goldstein] for a beautiful analysis using only elementary geometry." This is an addition, not a correction. After the book came out I ran across Goldstein and Goldstein's book "Feynman's Lost Lecture" which contains a very nice argument for Kepler's laws based on elementary geometry, in the spirit of Newton. If I were writing this book over again I would use their argument.

Sect. 4.1, Fig. 4.2, p. 116. Replace "P" with "Q" in the picture labeled "central projection".

Sect. 4.1, p. 118, center paragraph. Replace "pprojection" with "projection".

Sect. 5.3, third paragraph, p. 158. In paragraph beginning "Suppose a jet fighter ...", the sum $186,282 + 1$ should equal $186,283$ not $186,243$.

Sect. 5.5, Proposition 5.5.1. p. 165-166. Replace the first sentence in the statement of the proposition "Let A, B, and C be objects in a Minkowski spacetime" with "Let A, B and C be Minkowski observers". Delete the first sentence in the proof "Over a sufficiently short period of time ...". The discussion in this text is not deep enough to handle the tricky topic of acceleration (e.g. do accelerations affect the coordinates?) so it is best to simply assume velocities are constant.

Sect. 5.7, p. 169. Second paragraph from bottom. Replace M^n with $M^{(n+1)}$.

Sect. 5.7, Exercise 5.7.4, p. 173. Replace $-c^2|A|^2 + |B| = |C|^2$ with

$$-|A|^2 + |B| = |C|^2.$$

References, pp. 184. Insert new reference: "[12] Goodstein, David and Goodstein, Judith, Feynman's Lost Lecture, Norton, 1996." (Also renumber references 12-22).

Additional corrections that apply only to the first printing.

Sect. 1.3, Exercise 1.3.1, p. 4. Replace X with x, Y with y.

Sect. 1.3, Exercise 1.3.2 a, p. 4. Replace the phrase "depending on whether ... radii" with "depending on the distance between their centers and the sizes of their radii."

Sect. 1.4, Fig. 1.9, p. 7. Replace C with A, A with B, and B with C.

Sect. 2.3, Fig 2.8, p. 49. Replace b with c, c with b.

Sect. 2.3, Footnote 5, pg. 51. Replace the second B with v.

Sect. 2.6, pg. 60. In the paragraph starting "When one combines ...", in the second sentence "For example ...", replace C with c so it says $\angle a + \angle b + \angle c = 360°$.

Sect. 2.6, Exercise 2.6.1 a, p. 61. Replace a with A, b with B, and C with c.

Sect. 2.8, Line below fig. 2.16, p. 64. Replace "Boston" with "New York".

Sect. 3.2, Fig 3.5, p. 87. Replace $F_1 + F_2 = \text{const.}$ with $PF_1 + PF_2 = \text{const.}$

Sect. 3.3, Fig 3.11, p. 91. $\angle ZPR$ should be labeled α.

Sect. 3.8, Equation 3.22, p. 105. Replace $1/r$ with $1/r^2$.

Sect. 4.4, second paragraph, p. 126. Replace $\vec{v} = t$ with $\vec{v} = t\vec{w}$ in the displayed equation.

Sect. 5.2, Fig. 5.3, pg. 157. Replace stars with tildes.

Sect. 5.4, p. 161. In the second to last line, replace "$\tilde{x}$ coordinate equal to zero" with "$\tilde{t}$ coordinate equal to zero".

Sect. 5.4, p. 162. In the fourth displayed formula, replace $(x-a)/(2s(c-v))$ with $(x - ac)/(2s(c - v))$.