Errata for *3D Math Primer for Graphics and Games Development* first edition.

Page 61 The equation at the bottom of the page

$$
\begin{aligned}
\mathbf{v}_\perp + \mathbf{v}_\| &= \|v\| \\
\mathbf{v}_\perp &= \|\mathbf{v}\| - \mathbf{v}_\| \\
&= \|\mathbf{v}\| - \mathbf{n}\frac{\mathbf{v}\cdot\mathbf{n}}{\|\mathbf{n}\|^2}
\end{aligned}
$$

should read

$$
\begin{aligned}
\mathbf{v}_\perp + \mathbf{v}_\| &= \mathbf{v} \\
\mathbf{v}_\perp &= \mathbf{v} - \mathbf{v}_\| \\
&= \mathbf{v} - \mathbf{n}\frac{\mathbf{v}\cdot\mathbf{n}}{\|\mathbf{n}\|^2}
\end{aligned}
$$

Thanks to David Gould.

Page 62 The cross product example

$$
\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \times \begin{bmatrix} 2 \\ -5 \\ 8 \end{bmatrix} = \begin{bmatrix} (3)(8) - (-4)(-5) \\ (-4)(2) - (1)(8) \\ (1)(-5) - (3)(2) \end{bmatrix} = \begin{bmatrix} 4 \\ -16 \\ 10 \end{bmatrix}
$$

should read

$$
\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix} \times \begin{bmatrix} 2 \\ -5 \\ 8 \end{bmatrix} = \begin{bmatrix} (3)(8) - (4)(-5) \\ (4)(2) - (1)(8) \\ (1)(-5) - (3)(2) \end{bmatrix} = \begin{bmatrix} 44 \\ 0 \\ -11 \end{bmatrix}
$$

Thanks to Jake and many others.

Page 103 The text "...space? Looking at figure 8.3, it doesn't seem like ..." should read "...space? Looking at figure 8.2, it doesn't seem like ...". Thanks to Duncan Kimpton.

Page 165 The first big equation

$$
\begin{aligned}
&(w_1 + x_1 i + y_1 j + z_1 k)(w_2 + x_2 i + y_2 j + z_2 k) \\
={}& w_1 w_2 + w_1 x_2 i + w_1 y_2 j + w_1 z_2 k \\
&+ x_1 w_2 i + x_1 x_2 i^2 + x_1 y_2 ij + x_1 z_2 ik \\
&+ y_1 w_2 j + y_1 x_2 ji + y_1 y_2 j^2 + y_1 z_2 jk \\
&+ z_1 w_2 k + z_1 x_2 ki + z_1 y_2 kj + y_1 z_2 k^2 \\
={}& w_1 w_2 + w_1 x_2 i + w_1 y_2 j + w_1 z_2 k \\
&+ x_1 w_2 i + x_1 x_2 (-1) + x_1 y_2 k + x_1 z_2 (-j) \\
&+ y_1 w_2 j + y_1 x_2 (-k) + y_1 y_2 (-1) + y_1 z_2 i \\
&+ z_1 w_2 k + z_1 x_2 j + z_1 y_2 (-i) + y_1 z_2 (-1) \\
={}& w_1 w_2 - x_1 x_2 - y_1 y_2 - y_1 z_2 \\
&+ (w_1 x_2 + x_1 w_2 + y_1 z_2 - z_1 y_2)i \\
&+ (w_1 y_2 + y_1 w_2 + z_1 x_2 - x_1 z_2)j \\
&+ (w_1 z_2 + z_1 w_2 + x_1 y_2 - y_1 x_2)j
\end{aligned}
$$

should read

$$(w_1 + x_1 i + y_1 j + z_1 k)(w_2 + x_2 i + y_2 j + z_2 k)$$
$$
\begin{aligned}
=\;& w_1 w_2 + w_1 x_2 i + w_1 y_2 j + w_1 z_2 k \\
& + x_1 w_2 i + x_1 x_2 i^2 + x_1 y_2 ij + x_1 z_2 ik \\
& + y_1 w_2 j + y_1 x_2 ji + y_1 y_2 j^2 + y_1 z_2 jk \\
& + z_1 w_2 k + z_1 x_2 ki + z_1 y_2 kj + z_1 z_2 k^2 \\
=\;& w_1 w_2 + w_1 x_2 i + w_1 y_2 j + w_1 z_2 k \\
& + x_1 w_2 i + x_1 x_2 (-1) + x_1 y_2 k + x_1 z_2 (-j) \\
& + y_1 w_2 j + y_1 x_2 (-k) + y_1 y_2 (-1) + y_1 z_2 i \\
& + z_1 w_2 k + z_1 x_2 j + z_1 y_2 (-i) + z_1 z_2 (-1) \\
=\;& w_1 w_2 - x_1 x_2 - y_1 y_2 - z_1 z_2 \\
& + (w_1 x_2 + x_1 w_2 + y_1 z_2 - z_1 y_2)i \\
& + (w_1 y_2 + y_1 w_2 + z_1 x_2 - x_1 z_2)j \\
& + (w_1 z_2 + z_1 w_2 + x_1 y_2 - y_1 x_2)k
\end{aligned}
$$

Thanks to David Whittaker and Seth Hawkins.

Page 173 First paragraph. "The slerp operation is useful because it allows us to smoothly interpolate between two interpolations" should read "...interpolate between two quaternions." Thanks to David Whittaker.

Page 209 Three typos in the function headers comments.

"EulerAngles::setToRotateObjectToInertial"

should read

"Quaternion::setToRotateObjectToInertial,"

and

"EulerAngles::setToRotateInertialToObject"

should read

"Quaternion::setToRotateInertialToObject."

In the comment above the function Quaternion::setToRotateInertialToObject, the comment "...to perform an object→inertial rotation,..." should read "...to perform an inertial→object rotation,..." All typos are in the comments. The code is correct. Thanks to Joe Walters.

Pages 249 and 304 Typos in the AABB::add() code. The code should read:

```
//---------------------------------------------------------------------
// AABB3::add
//
// Add a point to the box

void    AABB3::add(const Vector3 &p) {

    // Expand the box as necessary to contain the point.

    if (p.x < min.x) min.x = p.x;
    if (p.x > max.x) max.x = p.x;
    if (p.y < min.y) min.y = p.y;
    if (p.y > max.y) max.y = p.y;
    if (p.z < min.z) min.z = p.z;
    if (p.z > max.z) max.z = p.z;
}

//---------------------------------------------------------------------
// AABB3::add
```

```
//
// Add an AABB to the box

void      AABB3::add(const AABB3 &box) {

    // Expand the box as necessary.

    if (box.min.x < min.x) min.x = box.min.x;
    if (box.min.x > max.x) max.x = box.min.x;
    if (box.min.y < min.y) min.y = box.min.y;
    if (box.min.y > max.y) max.y = box.min.y;
    if (box.min.z < min.z) min.z = box.min.z;
    if (box.min.z > max.z) max.z = box.min.z;
}
```

Thanks to Kevin Loney.

Page 255 Equation 12.13 reads

$$\mathbf{n}_x = (z_1 + z_2)(y_1 - y_2) + (z_2 + z_3)(x_2 - y_3) + \cdots + (z_{n-1} + z_n)(y_{n-1} - y_n) + (z_n + z_1)(y_n - y_1)$$
$$\mathbf{n}_y = (x_1 + x_2)(z_1 - z_2) + (x_2 + x_3)(x_2 - z_3) + \cdots + (x_{n-1} + x_n)(z_{n-1} - z_n) + (x_n + x_1)(z_n - z_1)$$
$$\mathbf{n}_z = (y_1 + y_2)(x_1 - x_2) + (y_2 + y_3)(x_2 - x_3) + \cdots + (y_{n-1} + y_n)(x_{n-1} - x_n) + (y_n + y_1)(x_n - x_1)$$

but should read

$$\mathbf{n}_x = (z_1 + z_2)(y_1 - y_2) + (z_2 + z_3)(y_2 - y_3) + \cdots + (z_{n-1} + z_n)(y_{n-1} - y_n) + (z_n + z_1)(y_n - y_1)$$
$$\mathbf{n}_y = (x_1 + x_2)(z_1 - z_2) + (x_2 + x_3)(z_2 - z_3) + \cdots + (x_{n-1} + x_n)(z_{n-1} - z_n) + (x_n + x_1)(z_n - z_1)$$
$$\mathbf{n}_z = (y_1 + y_2)(x_1 - x_2) + (y_2 + y_3)(x_2 - x_3) + \cdots + (y_{n-1} + y_n)(x_{n-1} - x_n) + (y_n + y_1)(x_n - x_1)$$

Thanks to Jim Norwood.

Page 274 The code snippet has an error in the comment and in the actual code itself. The code which reads:

```
// Figure out what the sum of the angles should be, assuming
// we are convex.  Remember that pi/2 rad = 180 degrees

float convexAngleSum = (float)(n − 2) ∗ kPiOverTwo;
```

Should read:

```
// Figure out what the sum of the angles should be, assuming
// we are convex.  Remember that pi rad = 180 degrees

float convexAngleSum = (float)(n − 2) ∗ kPi;
```

Thanks to Jose Angel Herrero Bajo.

Page 420 "Gimbel" should read "Gimbal". Thanks to Mark Hoffman.