1.8 Relating Trigonometric Functions

1. Answers:
   a. $\frac{1}{4}$
   b. $\frac{3}{1} = 3$
2. (a)

TABLE 1.2:

Angle	Sin	Csc
10	.1737	5.759
5	.0872	11.4737
1	.0175	57.2987
0.5	.0087	114.5930
0.1	.0018	572.9581
0	0	undefined
-.1	-.0018	-572.9581
-.5	-.0087	-114.5930
-1	-.0175	-57.2987
-5	-.0872	-11.4737
-10	-.1737	-5.759

(b) As the angle gets smaller and smaller, the cosecant values get larger and larger.

(c) The range of the cosecant function does not have a maximum, like the sine function. The values get larger and larger.

(d) Answers will vary. For example, if we looked at values near 90 degrees, we would see the cosecant values get smaller and smaller, approaching 1.

3. The values 90, 270, 450, etc, are excluded because they make the function undefined.
4. Answers:
   a. Quadrant 1; positive
   b. Quadrant 3; negative
   c. Quadrant 4; negative
   d. Quadrant 2; negative
5. $\frac{8}{6} = \frac{4}{3}$
6. The ratio of sine and cosine will be positive in the third quadrant because sine and cosine are both negative in the third quadrant.
7. $\cos\theta \approx .92$
8. $\csc\theta = \sqrt{5}$

9.

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\begin{aligned}
\cos^2\theta + \sin^2\theta &= 1 \\
\frac{\cos^2\theta + \sin^2\theta}{\cos^2\theta} &= \frac{1}{\cos^2\theta} \\
1 + \frac{\sin^2\theta}{\cos^2\theta} &= \frac{1}{\cos^2\theta} \\
1 + \tan^2\theta &= \sec^2\theta
\end{aligned}
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10. Using the Pythagorean identities results in a quadratic equation and will have two solutions. Stating that the angle lies in a particular quadrant tells you which solution is the actual value of the expression. In #7, the angle is in the first quadrant, so both sine and cosine must be positive.