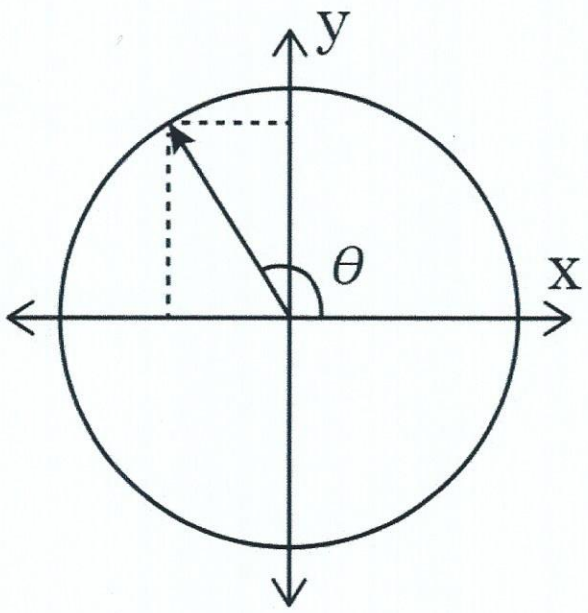
## CS148: Reading Guide, Tuesday 1 July

Shirley Ch. 2 pp. 13-29, Ch. 4: Ray Tracing

You'll be needing your basic trig and linear algebra for the second assignment. You should find this reading extremely helpful! The chapter on ray tracing provides a foundation for understanding what you'll be asked to do in HW2, along with many useful derivations.




The figure at left shows the unit circle in the x,y plane. A vector lies on the unit circle at an angle θ to the x-axis as shown.

1) What is the value of the vector projected onto the x-axis? y-axis? (see dashed lines.)

x-axis: $\cos\theta$

y-axis: $\sin\theta$

2) Prove the Pythagorean identity, $\sin^2(\theta) + \cos^2(\theta) = 1$.
(Feel free to continue on the back of this sheet.)

From section 2.3.2 we have

$a^2 + o^2 = h^2$

$\left(\frac{a}{h}\right)^2 + \left(\frac{o}{h}\right)^2 = 1$

since $\sin\theta = \frac{o}{h}$ and $\cos\theta = \frac{a}{h}$

$\cos^2\theta + \sin^2\theta = 1$

3) If you took the dot product of the given vector with $(1, 0)^T$, would the sign be positive or negative? (Visualize projecting the vector onto the x-axis.)

negative

4) What kind of material might you visualize with Lambertian shading? Blinn/Phong shading?

Lambert: rough fabric

Blinn/Phong: smooth marble