Sept. 12.

- Diagnostic Test } completion marks.
- MAPS
- Labs this week.

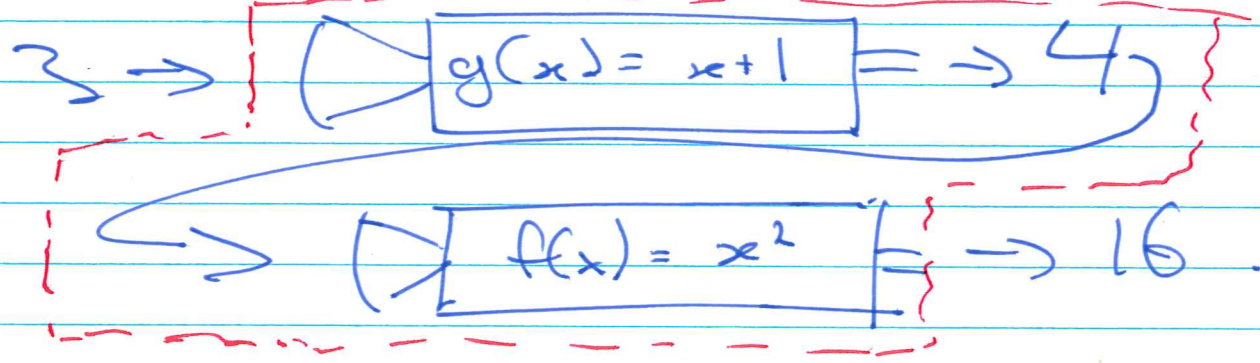
L1A 48/30
L1B 44/30.
L1D. 2.
↳ 12:30 - 2 pm Thursday

- First HW and Lab posted.
  ↳ due Monday.

Composition of Functions.

Given two functions we can imagine taking the output from one function and using it as the input for the second function.

For example take $g(x) = x+1$, $f(x) = x^2$.



We call this $f(g(x)) = (f \circ g)(x)$.

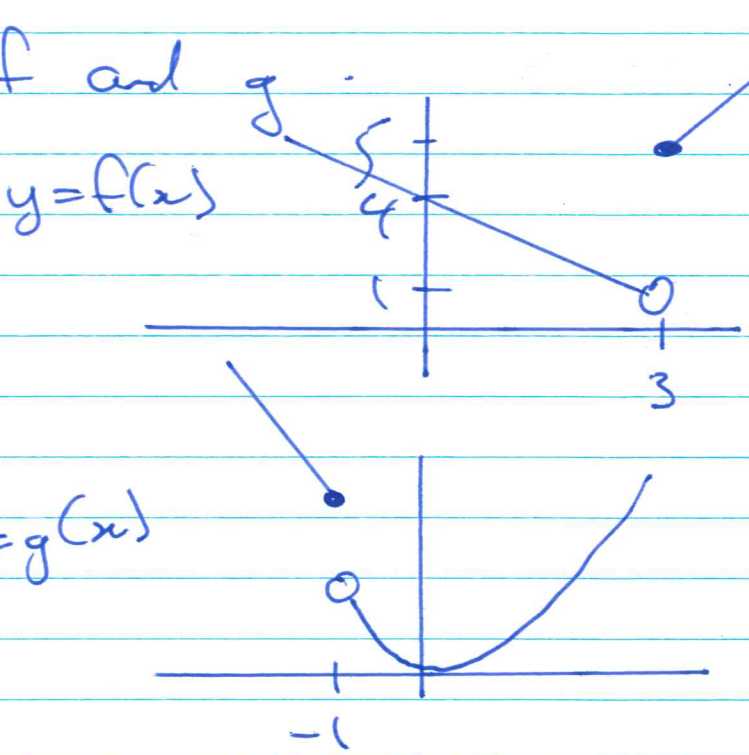
$3 \to \boxed{f(g(x))} = \to 16$.

In this example $f(g(x)) = f(x+1)$
$= (x+1)^2$.

Example: Let $f(x) = \begin{cases} 2x-1, & x \geq 3 \\ -x+4, & x < 3 \end{cases}$,

$g(x) = \begin{cases} x^2, & x > -1 \\ -3x, & x \leq -1 \end{cases}$.

Plot f and g.



Clicker Q: what is $f(g(2))$?

A) 16 B) 3

C) 5 D) 7

$f(g(2)) = f(4) = 7$.

$g(2) = 4$.

Can we find a general formula for $f(g(x))$?

$$f(g(x)) = \begin{cases} \text{post later.} & x < -1 \\ & -1 < x < 3 \end{cases}$$

See note →

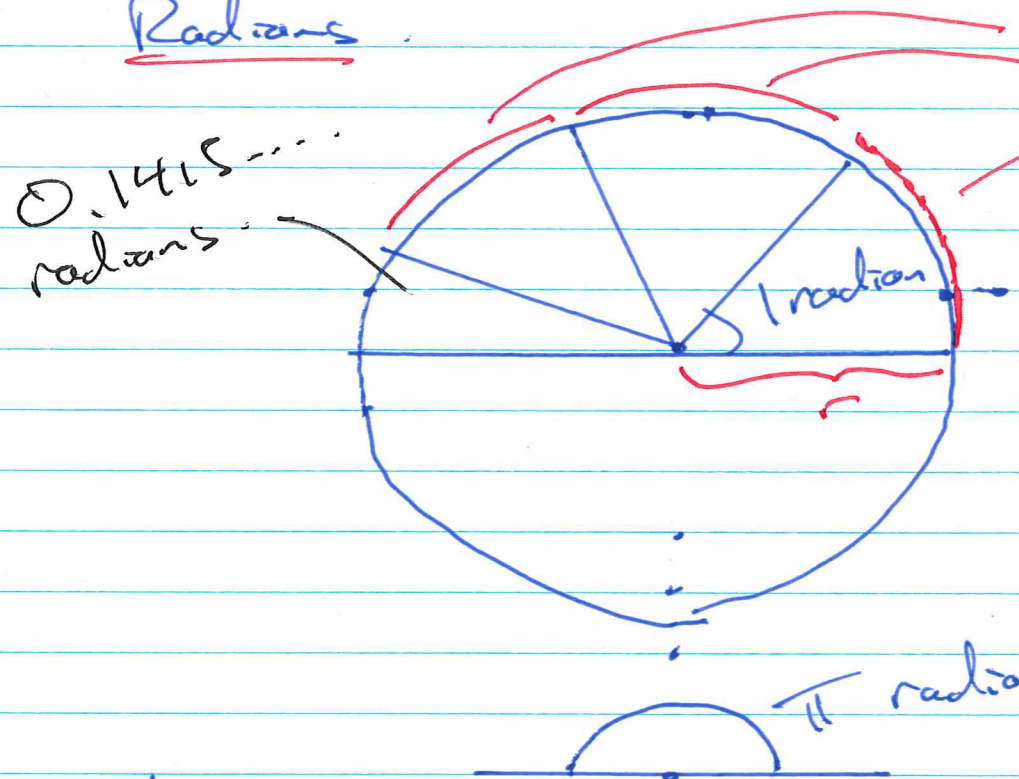
Trigonometry.

Radians vs Degrees.

We need to decide how to measure angles.

Degrees: Cut the circle into 360°.
- there are a lot of factors. Babylonians really liked multiples of 60.

The natural units to use are **Radians**.



There are 2π radians in the circle.

$C = 2\pi r$

C circumference.

(5)

Clicker Q: $\pi/3$ rad $\leftrightarrow$? Degrees

A) 30° - $\pi/6$.

B) 45° - $\pi/4$

→ C) 60° - $\pi/3$

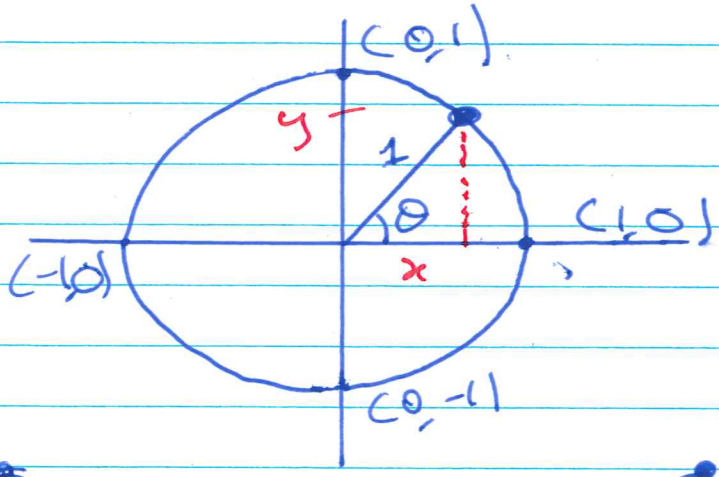
D) 90° - $\pi/2$

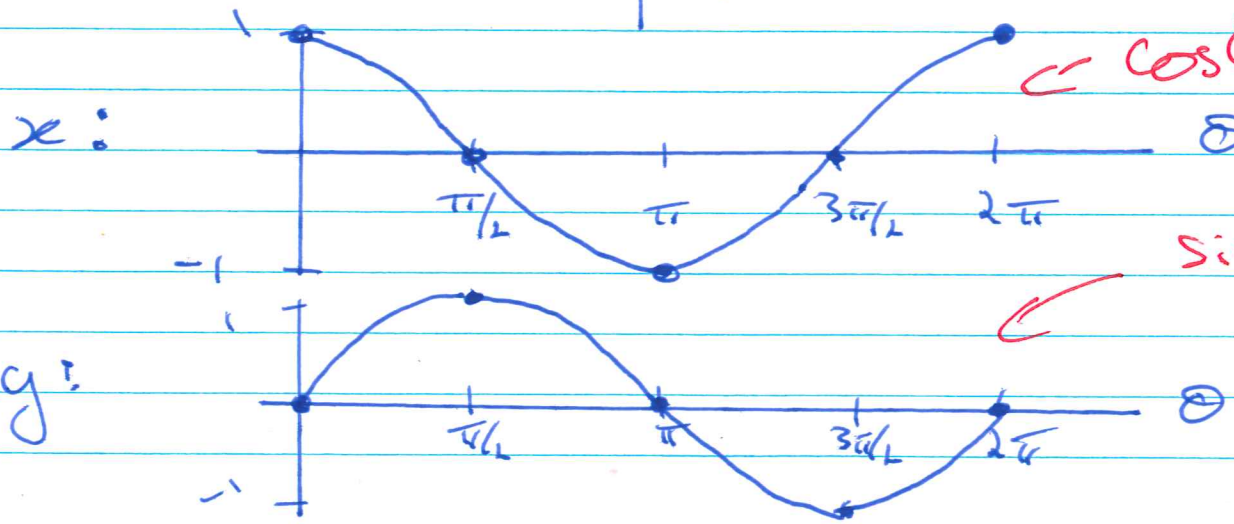
angle in deg. = angle in rad $\cdot \frac{180}{\pi}$.

$\frac{\pi}{180} \cdot$ angle in deg = angle in rad.

Trigonometric Functions

Consider a point on the unit circle.

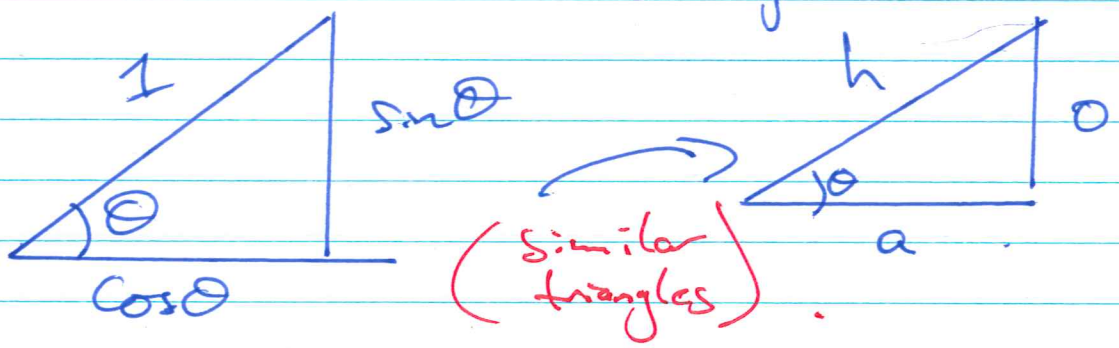




$$\frac{\sin\theta}{\cos\theta} = \tan\theta.$$

Also, $\sin^2\theta + \cos^2\theta = 1$.

— use Pythagorean Theorem $x^2 + y^2 = 1^2$.



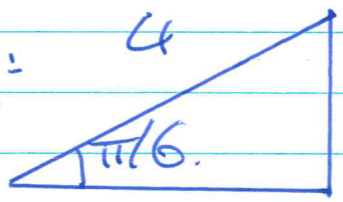
$$\frac{\sin\theta}{1} = \frac{o}{h}.$$

$$\frac{\cos\theta}{1} = \frac{a}{h}.$$

$$\frac{\sin\theta}{\cos\theta} = \tan\theta = \frac{o}{a}.$$

recovers familiar "SOHCAHTOA"

Example:



Find d.