Today

- More trig review
- Rhythmic processes
- Reminders:
  - OSH 7 due Monday
  - Final exam - Dec 6 @ 3:30 in SRC (ABC)

Trig review

Which of the following is false?

(A) cos(arctan(sqrt(3))) = 1/2

(B) sin(arccos(1/2)) = sqrt(3)/2

(C) arctan(1) = π/4

(D) arcsin(1/2) = π/3

(E) sin(3π/2) = -1

Note: $\cos^{-1}(x) = \arccos(x)$, $\tan^{-1}(x) = \arctan(x)$.

Trig review

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(D) arcsin(1/2) = π/3

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Trig review

Which is true for all x and y?

(A) $\cos(x+y) = \cos(x)\cos(y) + \sin(x)\sin(y)$

(B) $\cos(x+y) = \cos(x)\sin(y) - \sin(x)\cos(y)$

(C) $\cos(x+y) = \cos(x)\cos(y) - \sin(x)\sin(y)$

Trig review

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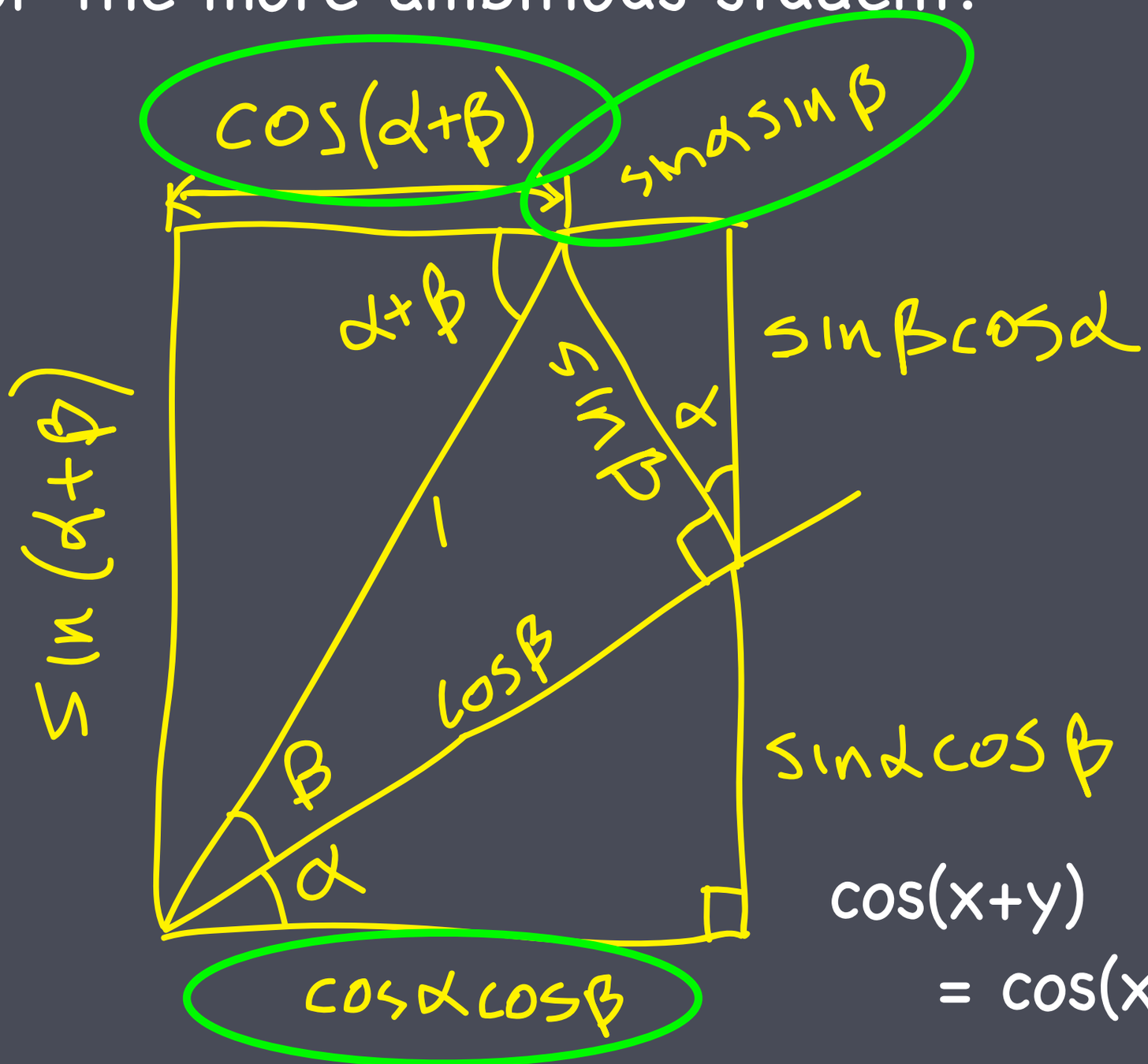
(C) $\cos(x+y) = \cos(x)\cos(y) - \sin(x)\sin(y)$

Plug in $x=\theta$ and $y=-\theta$ to check each one.
Or leave x as is and sub in $y=0$ and v.v.

Trig review

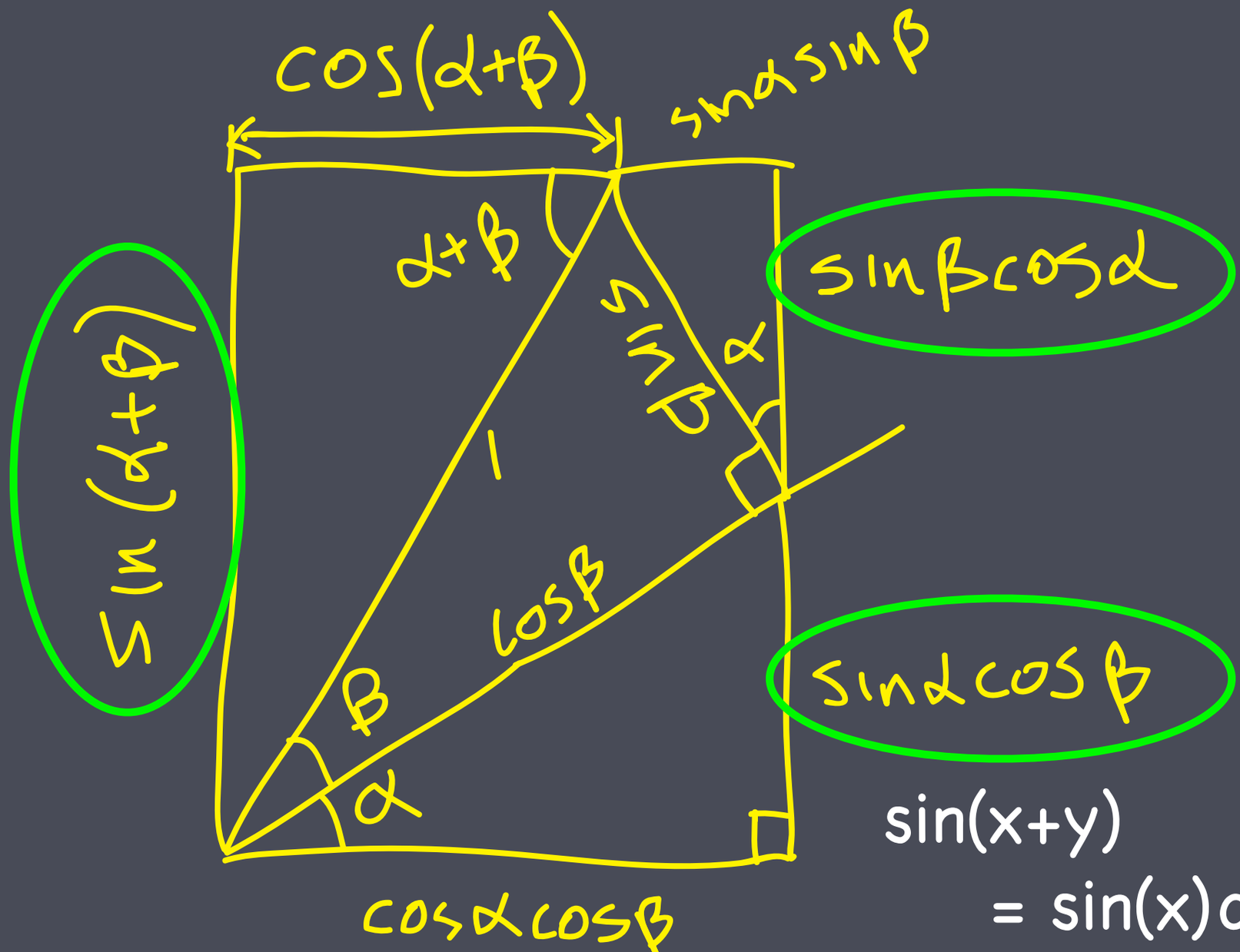
For the more ambitious student:



$$\cos(x+y) = \cos(x)\cos(y) - \sin(x)\sin(y)$$

Trig review

For the more ambitious student:



$$\sin(x+y) = \sin(x)\cos(y) + \sin(y)\cos(x)$$

Some trig definitions

- The period (T) is the smallest number for which $f(t+T)=f(t)$ for all t. For $f(t) = M + A \sin(Ct-D)$, $T=2\pi/C$.
- The amplitude is (max-min)/2. For $f(t)$, it's A.
- The average or midline is (max+min)/2. For $f(t)$, it's M.
- The time-shift is the time at which the argument of the trig function is zero. For $f(t)$, it's D/C. To see this, rewrite it as $f(t) = M + A \sin(C(t-D/C))$.

Trig review

What is the period (T) of $h(t) = 8 - 6\sin(4t+1)$?

(A) $T=4$

(B) $T=1$

(C) $T=1/4$

(D) $T=2\pi$

(E) $T=\pi/2$

Trig review

What is the period (T) of $h(t) = 8 - 6\sin(4t+1)$?

(A) T=4

(B) T=1

(C) T=1/4

(D) T=2π

(E) T=π/2

Period of sin(x) is 2π so...

- When is $(4t+1)=0$? $t_1=-1/4$
- When is $(4t+1)=2\pi$? $t_2=\pi/2-1/4$
- $T = t_2-t_1 = \pi/2$.
- Shift doesn't matter so you can just find T so that $4T=2\pi$.

Trig review

What is the amplitude of $h(t) = 8 - 6\sin(4t+1)$?

(A) 14

(B) 8

(C) 12

(D) 6

(E) -6

Trig review

What is the amplitude of h(t) = 8 - 6sin(4t+1)?

(A) 14

(B) 8

(C) 12

(D) 6

(E) -6

- h(t) goes from a low of 8-6 to a high of 8+6 so the amplitude is 6.

Trig review

What is the time-shift of $h(t) = 8 - 6\sin(4t+1)$?

(A) -1

(B) -1/4

(C) 4

(D) $4/2\pi$

(E) $1/2\pi$

Trig review

What is the time-shift of h(t) = 8 - 6sin(4t+1)?

(A) -1

(B) -1/4

(C) 4

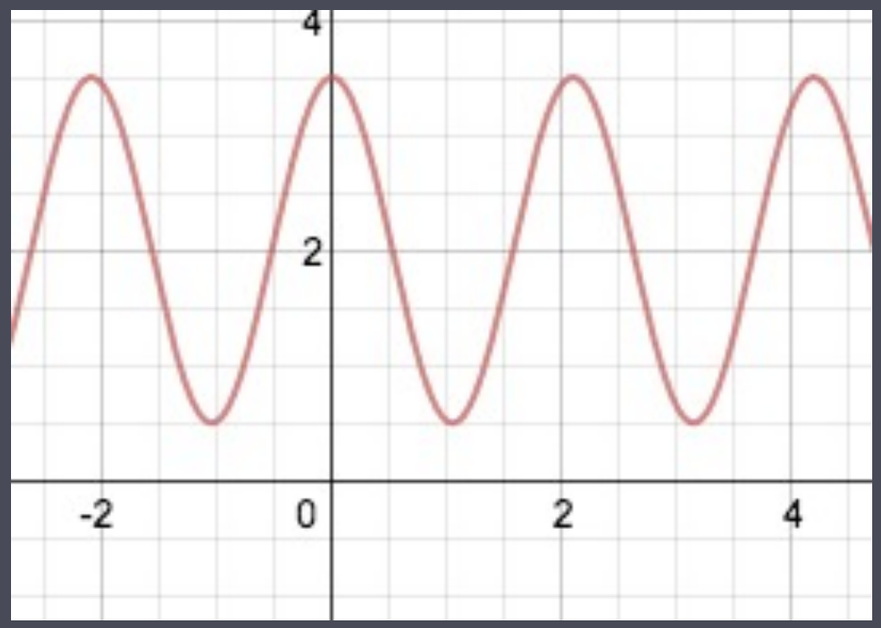
(D) 4/2π

(E) 1/2π

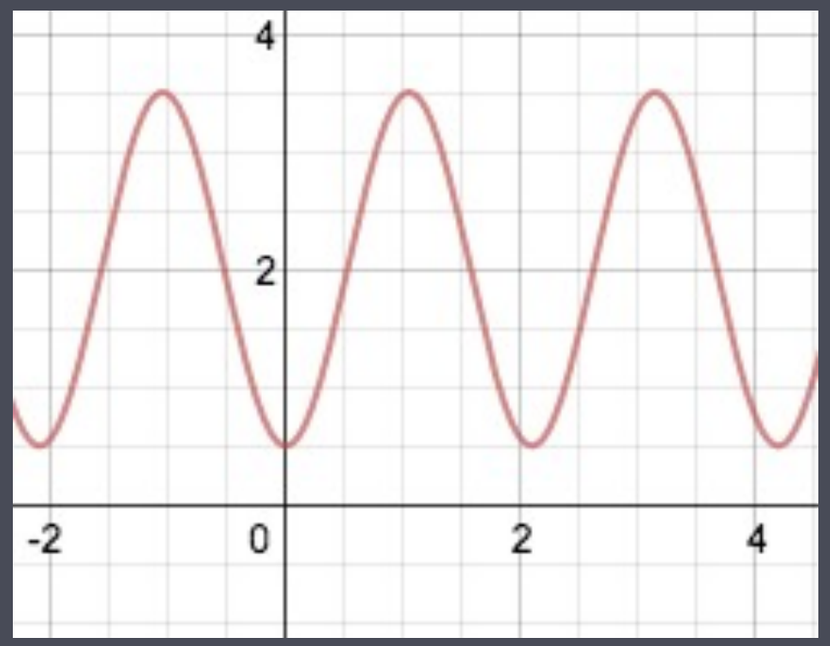
- Rewrite as
  h(t)= 8 - 6 sin(4 (t+1/4))
  to see that h(t) is sin(4t) shifted by -1/4.
- By some definitions, time-shift is 1/4.

Which is the graph of $y = 2 + 1.5 \sin(3x - \pi/2)$?

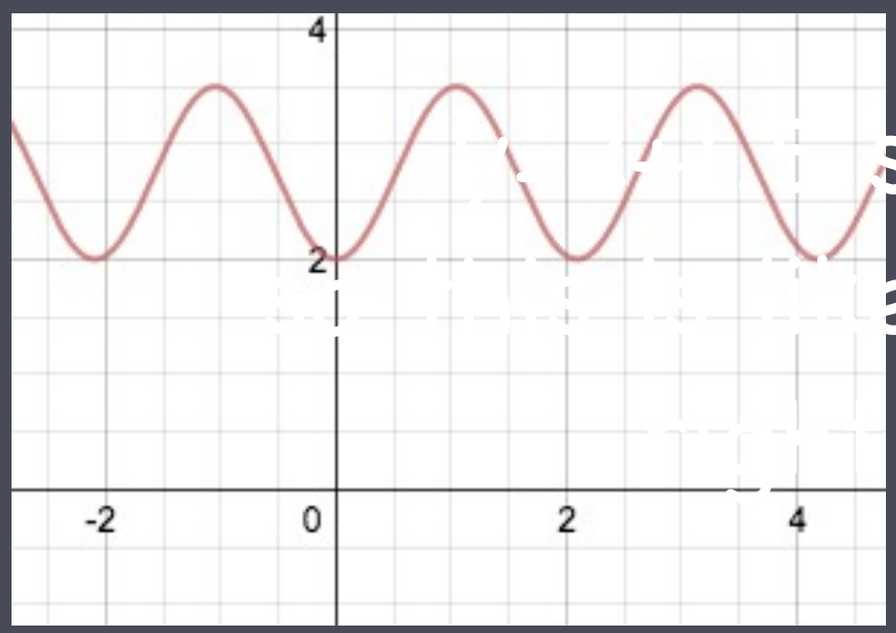
(A)



(B)

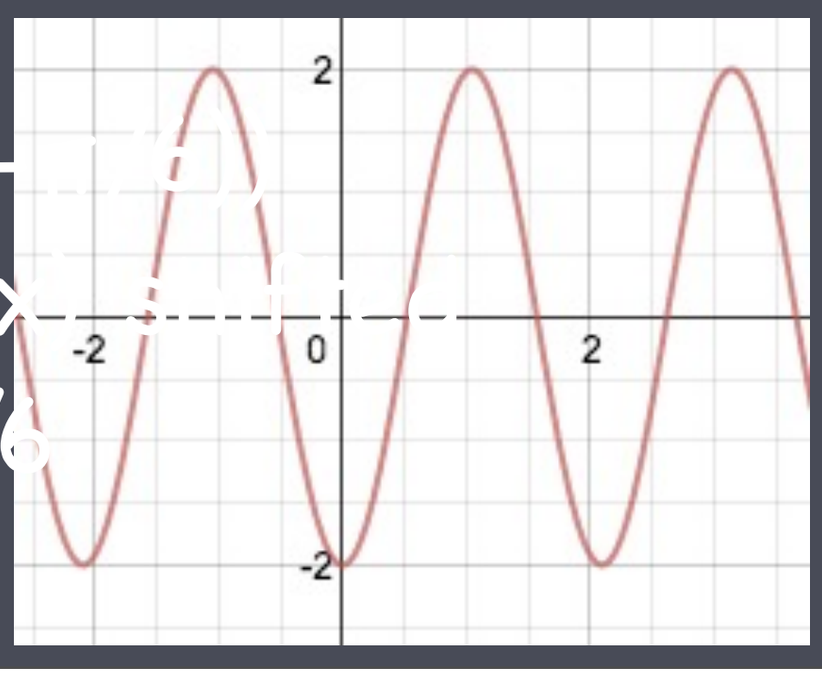


(C)



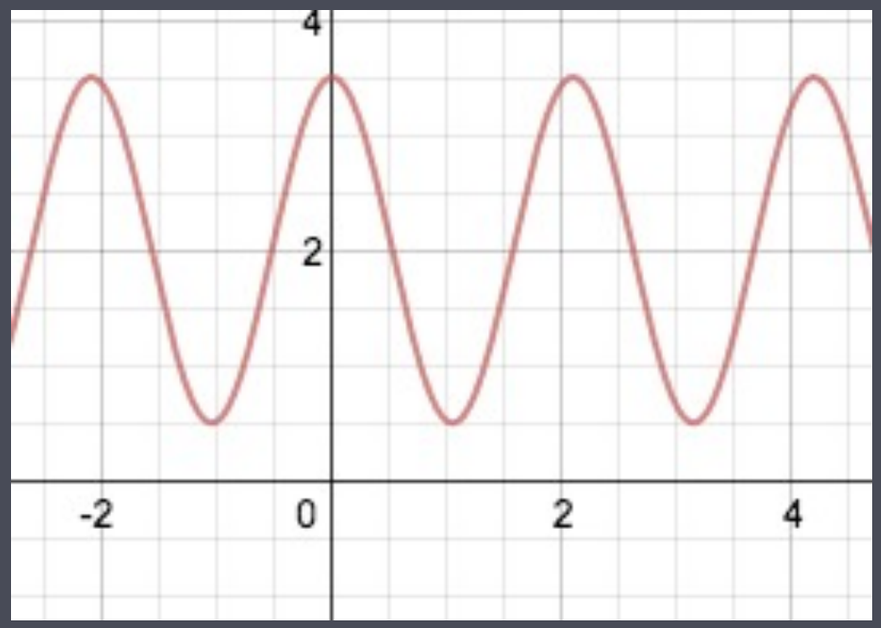
(D) $y = 2 + 1.5 \sin(3(x - \pi/6))$

Translate sin(3x - π/2) by π/6

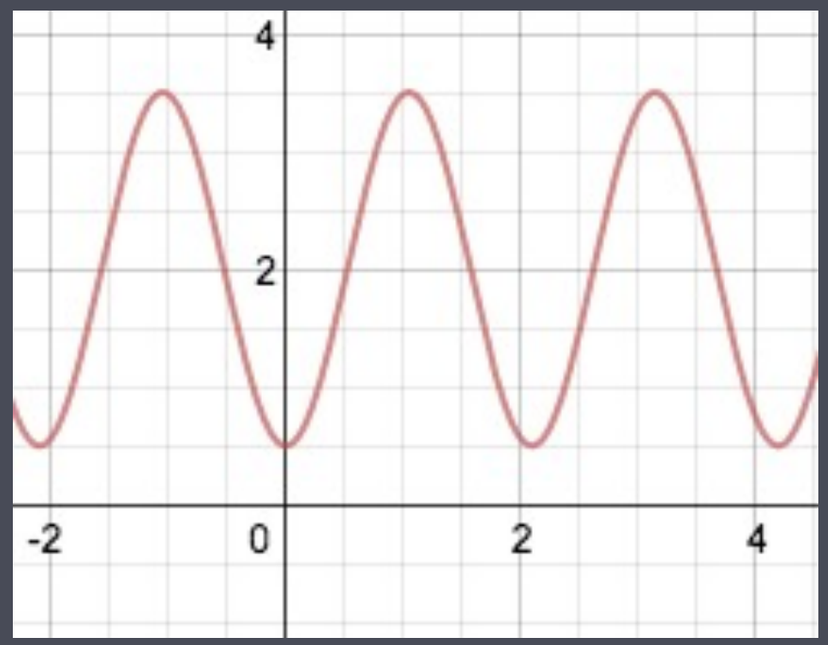


Which is the graph of $y = 2 + 1.5 \sin(3x - \pi/2)$?

(A)



(B)



$y=2+1.5 \sin(3(x-\pi/6))$

so this is like $\sin(3x)$ shifted right by $\pi/6$.

Annual variation in daylight per day in Vancouver (Jan 1 --> t=0)

(A) $L(t) = 12 + 4\cos\left(\frac{2\pi}{365}(t - 172)\right)$

(B) $L(t) = 12 + 4\sin\left(\frac{2\pi}{365}(t - 172)\right)$

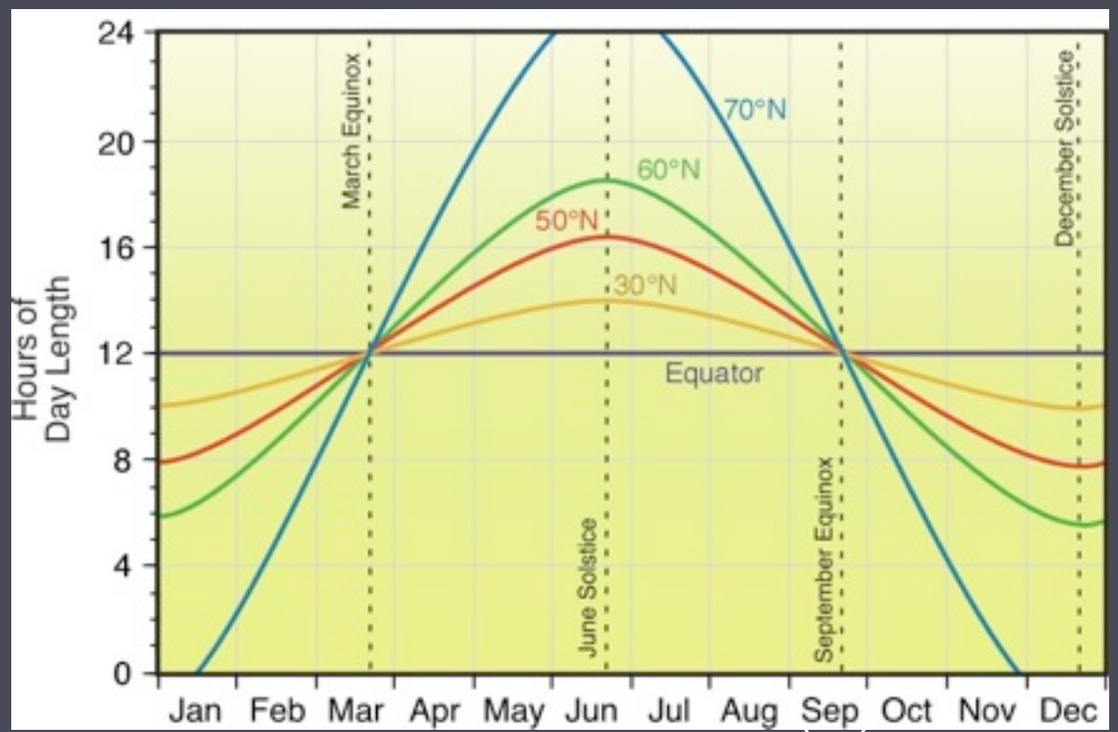
(C) $L(t) = 12 + 4\sin\left(\frac{2\pi}{365}(t + 80)\right)$

(D) $L(t) = 12 - 4\sin\left(\frac{2\pi}{365}(t - 80)\right)$

Note: t=172 is June 21; t=80 is March 21.

Annual variation in daylight per day in Vancouver (Jan 1 --> t=0)

(A) $$L(t) = 12 + 4\cos\left(\frac{2\pi}{365}(t-172)\right)$$



$$+ 4\sin\left(\frac{2\pi}{365}(t-172)\right)$$

$$+ 4\sin\left(\frac{2\pi}{365}(t+80)\right)$$

$$- 4\sin\left(\frac{2\pi}{365}(t-80)\right)$$

Note: t=172 is June 21; t=80 is March 21.