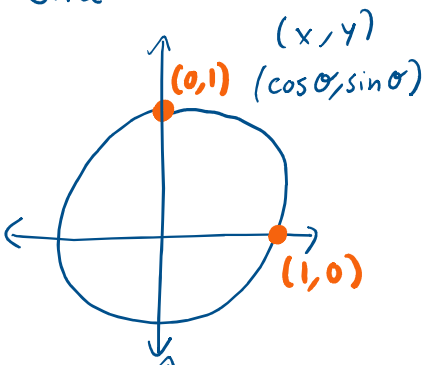
Reminders

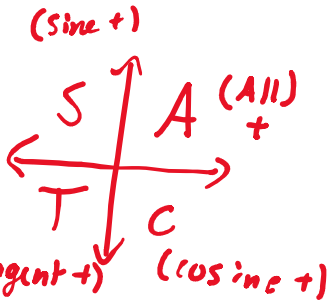
Friday's class is virtual & Written HW Due Friday via email

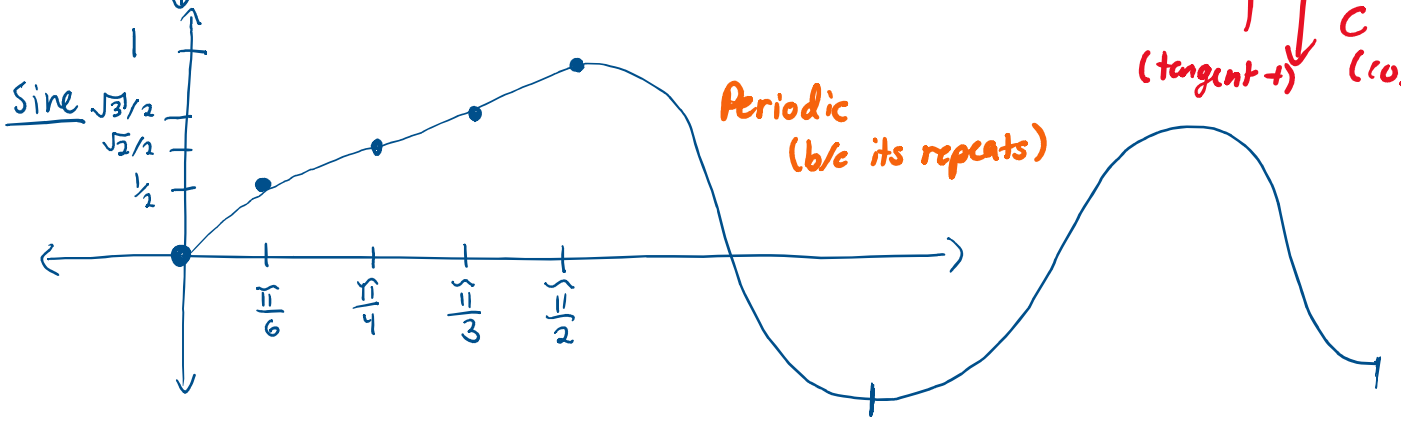
Lesson 26: Graphs of Trig Functions

Sine and cosine



	0	π/6	π/4	π/3	π/2
Sin	$\sqrt{0}/2$	$\sqrt{1}/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	$\sqrt{4}/2$
Cos	$\sqrt{4}/2$	$\sqrt{3}/2$	$\sqrt{2}/2$	$\sqrt{1}/2$	$\sqrt{0}/2$





Amplitude: (How tall) $\frac{\max - \min}{2} = amp = \frac{1-(-1)}{2} = \frac{2}{2} = 1$

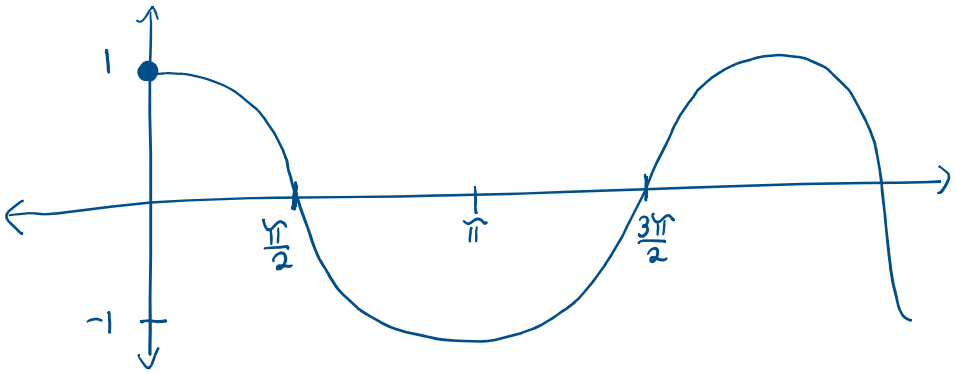
Period: (How long does it take to repeat) 2π

Domain: $(-\infty, \infty)$ range: $[-1, 1]$

Cosine

	0	π/6	π/4	π/3	π/2
Sin	$\sqrt{0}/2$	$\sqrt{1}/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	$\sqrt{4}/2$
Cos	$\sqrt{4}/2$	$\sqrt{3}/2$	$\sqrt{2}/2$	$\sqrt{1}/2$	$\sqrt{0}/2$

cos	$\sqrt{4}/2$	$\sqrt{3}/2$	$\sqrt{2}/2$	$\sqrt{1}/2$	$\sqrt{0}/2$
	1				0



Amplitude: 1
period: 2π
Domain: $(-\infty, \infty)$
Range: $[-1, 1]$

Relationship between sine and cosine

$$\cos(x) = \sin\left(x + \frac{\pi}{2}\right)$$

Ex 1: Sketch two periods of the graph of $y = 3\sin\left(\frac{x}{5}\right) + 1$. Then find the amplitude, the period, and the midline.

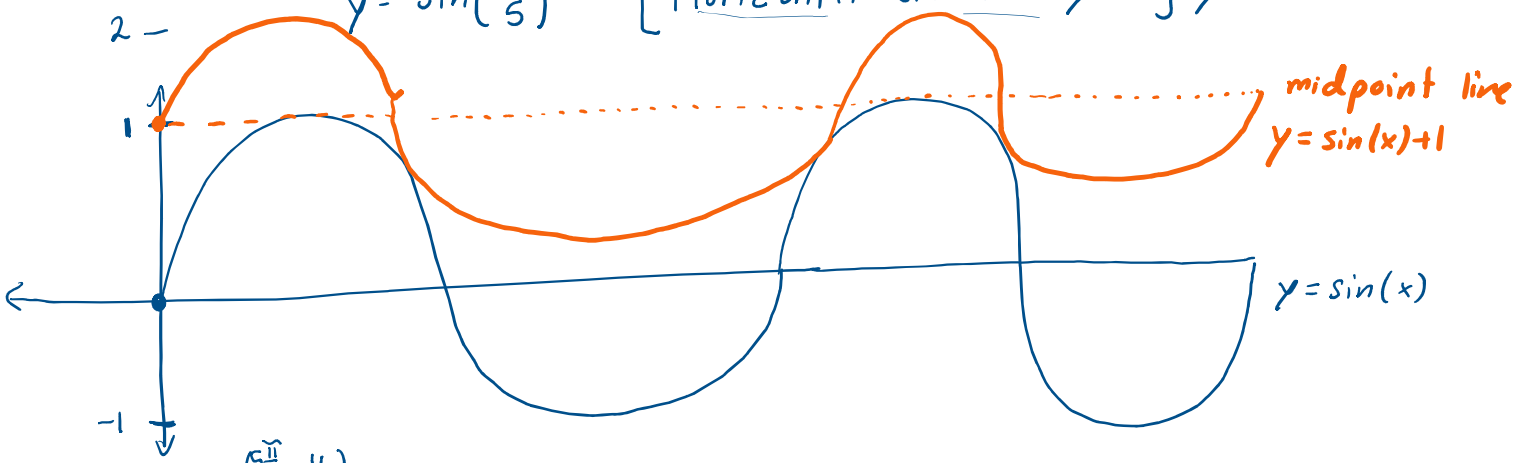
Original: $y = \sin(x)$

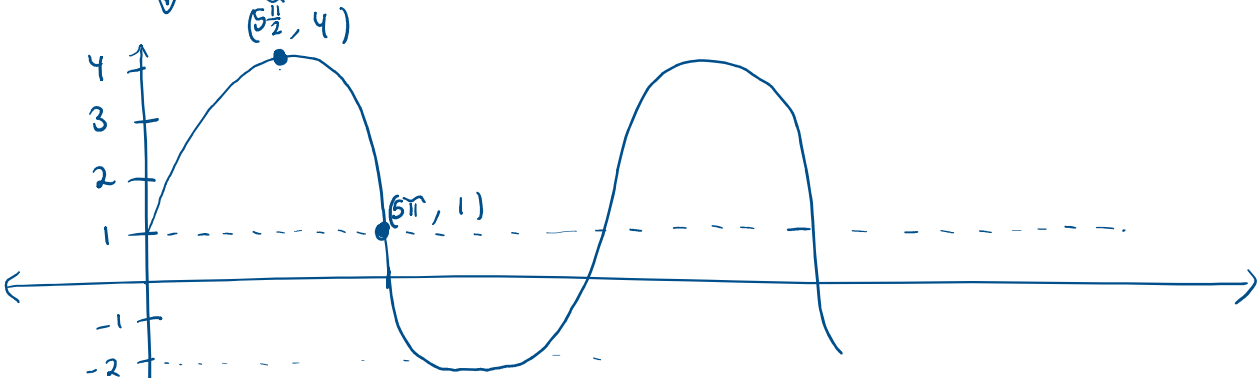
$y = \sin(x) + 1$ [Vertical Shift up by 1]

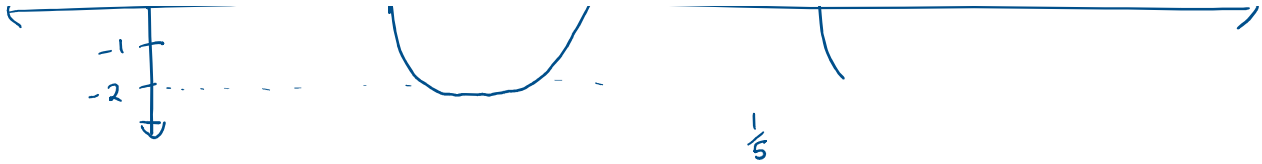
$y = 3\sin(x)$ [Vertical Stretch by 3]

$y = \sin\left(\frac{x}{5}\right)$ [Horizontal stretch by 5]

Together is $y = 3\sin\left(\frac{x}{5}\right) + 1$







Amp: 3 Period: $y = \sin(\frac{1}{5}x)$

$\frac{2\pi}{a} = \frac{2\pi}{1/5} = 10\pi$

Recap: Transformations of the sine and cosine functions.

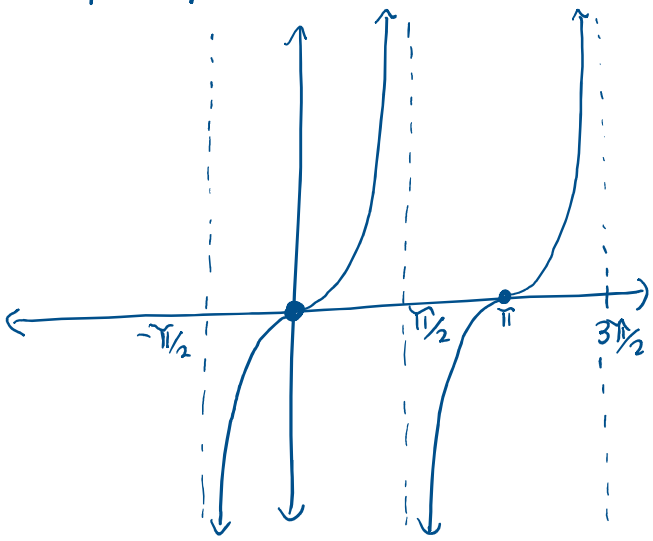
$y = a\sin(bx) + d$ or $y = a\cos(bx) + d$

Amplitude: $|a|$ Period: $\frac{2\pi}{|b|}$ midline: $y = d$

Domain: $(-\infty, \infty)$ Range: $[-|a|, |a|]$

Tangent $= \frac{\sin\theta}{\cos\theta}$

	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
sin	0	$\sqrt{1}/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
cos	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$\sqrt{1}/2$	0
tan	0	$1/\sqrt{3}$	1	$\sqrt{3}$	undefined



Amplitude: DNE
Minima & Maxima: None

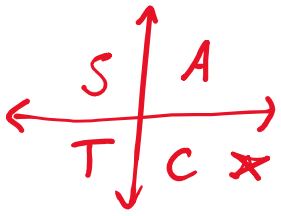
Stretching factor $|a|$

Asymptotes: $x = \frac{\pi}{2} + \pi \cdot n$

Period: π

Midline: $y = 0$

Domain: $\mathbb{R}$ but $x \neq \frac{\pi}{2} + \pi \cdot n$



Ex 2: Discuss the transformations of $y = -2\tan(3x) + 1$

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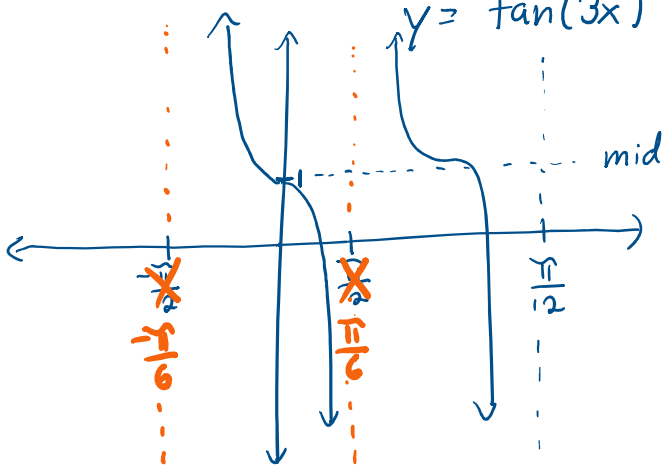
Original: $y = \tan(x)$

$y = \tan(x) + 1$ [Vertical Shift up by 1] ✓

$y = -\tan(x)$ [Reflection on Vertical] ✓

$y = 2\tan(x)$ [Vertical Shift by 2]

$y = \tan(3x)$ [Horizontal compression by 3] ✓



Recap: $y = a\tan(bx) + d$

Stretching factor: $|a|$ Period: $\frac{\pi}{|b|}$ domain: $x \neq \frac{\frac{\pi}{2} + \pi \cdot n}{|b|}$

Asymptote: $x = \frac{\frac{\pi}{2} + \pi \cdot n}{|b|}$ Midline: $y = d$ range: $(-\infty, \infty)$