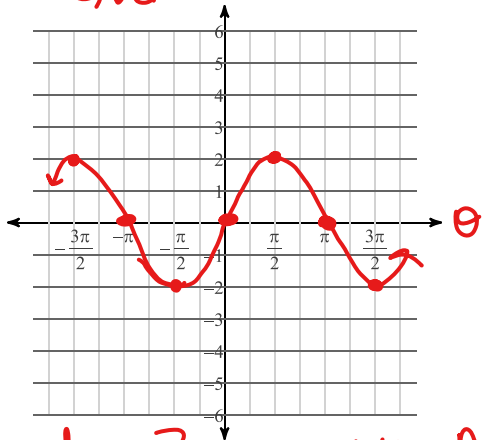


Graphing Trig Functions Notes

Find the amplitude, the period in radians, the minimum and maximum values, and two vertical asymptotes (if any). Then sketch the graph using radians.

1) $y = 2\sin \theta$

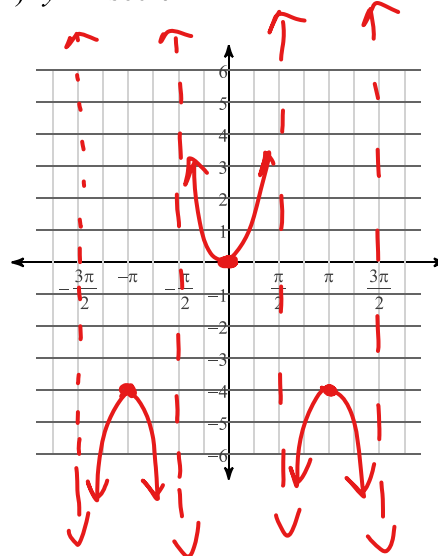
Vertical stretch



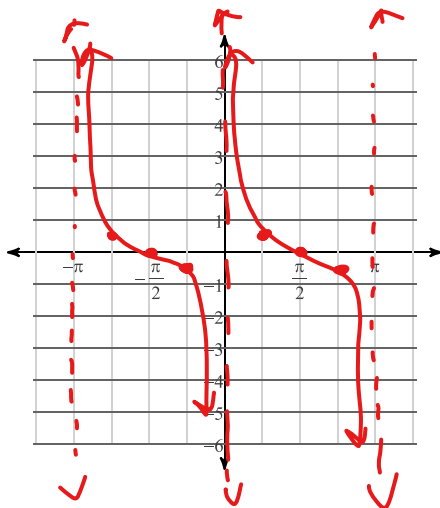
*amplitude 2
period 2π
min -2
max 2*

asym n/a

2) $y = 2\sec \theta - 2$



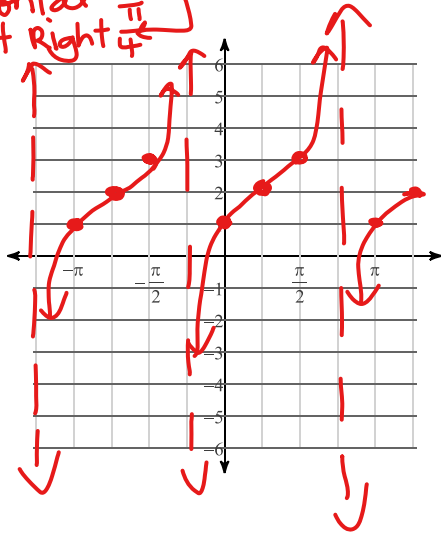
3) $y = \frac{1}{2} \cdot \cot \theta$



Find the amplitude, the period in radians, the phase shift in radians, the vertical shift, the minimum and maximum values, and two vertical asymptotes (if any). Then sketch the graph using radians.

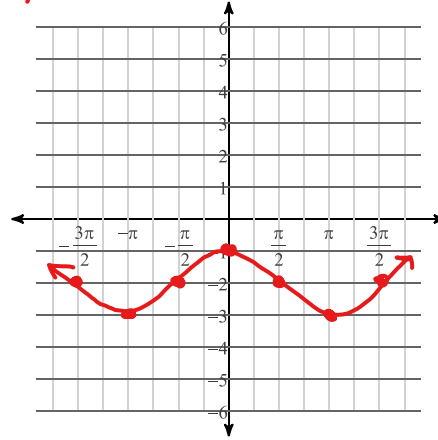
4) $y = \tan\left(\theta - \frac{\pi}{4}\right) + 2$

Vertical shift up 2
Horizontal shift Right $\frac{\pi}{4}$



5) $y = -2 + \sin\left(\theta + \frac{\pi}{2}\right)$

Vertical shift down 2
amp = 1
Hor. shift Left $\frac{\pi}{2}$

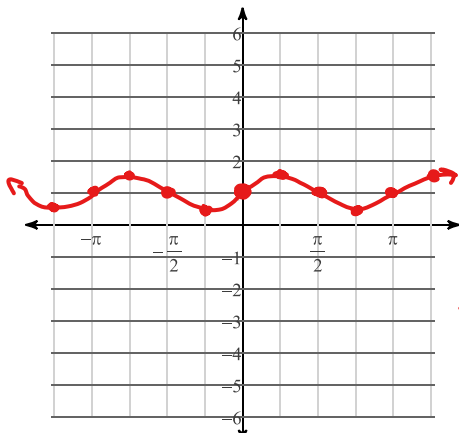


Find the amplitude, the period in radians, the phase shift in radians, and the minimum and maximum values. Then sketch the graph using radians.

6) $y = \frac{1}{2} \cdot \sin 2\theta + 1$

Vertical shrink
Vert. shift up 1
Horizontal compression

$y = \sin b\theta$



$$\frac{\text{old Period}}{b} = \text{new period} = \frac{2\pi}{2} = \pi$$

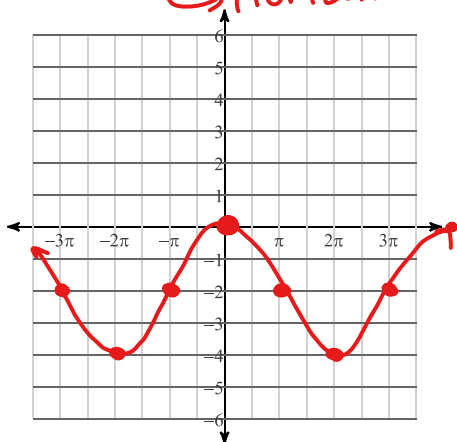
$$P = \frac{\pi}{4} \rightarrow$$

Vertical stretch

Vertical shift down

$$7) y = 2\cos\frac{\theta}{2} - 2$$

Horizontal stretch (factor of 2)



$$\text{Old period} = \frac{2\pi}{1/2} = 4\pi$$

$$\frac{P}{4} = \frac{4\pi}{4} = \pi$$

Find the exact values of the five trigonometric ratios not given.

Q2
 $(y > 0)$
 8) $\sin \theta = \frac{2\sqrt{5}}{5}$ and $\cos \theta < 0$
 $(x < 0)$

$$\frac{2\sqrt{5}}{5} \rightarrow \frac{2}{\sqrt{5}}$$

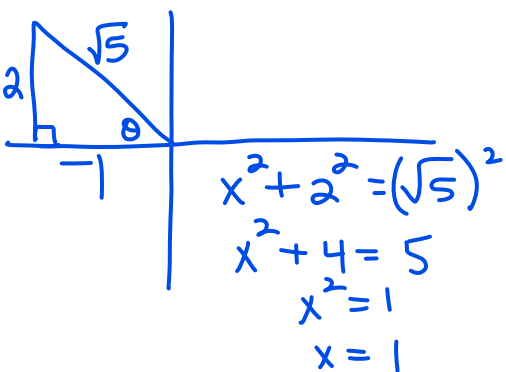
$$\cos \theta = \frac{-1}{\sqrt{5}} = \frac{-\sqrt{5}}{5}$$

$$\tan \theta = -2$$

$$\csc \theta = \frac{\sqrt{5}}{2}$$

$$\sec \theta = -\sqrt{5}$$

$$\cot \theta = -\frac{1}{2}$$



Use the given point on the terminal side of angle θ to find the value of the trigonometric function indicated.

9) $\cos \theta$; $(5, -\sqrt{11})$

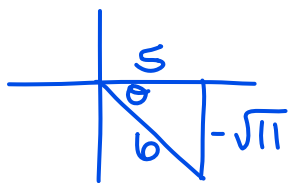
$$5^2 + (-\sqrt{11})^2 = c^2$$

$$25 + 11 = c^2$$

$$36 = c^2$$

$$6 = c$$

$$\cos \theta = \frac{5}{6}$$



Find all roots.

10) $2x^3 - 9x^2 + 10x = 0$

$$x(2x^2 - 9x + 10) = 0$$

$$x(2x - 5)(x - 2) = 0$$

zeros (roots) $x = 0, 2, \frac{5}{2}$

DIFF of cubes / solve for by cuberooting, etc

Find all roots including complex roots.

11) $x^3 - 27 = 0$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$(x - 3)(x^2 + 3x + 9)$$

↳ the trinomial has no zeros

$x = 3$
is the only
real root

Quadratic Formula

$$\frac{-3 \pm \sqrt{3^2 - 4(1)(9)}}{2(1)} = \frac{-3 \pm \sqrt{-27}}{2} = \frac{-3 \pm 3i\sqrt{3}}{2}$$

Factor each to linear and irreducible quadratic factors and find all roots.

12) $3x^4 - 11x^3 - 7x^2 + 11x + 4 = 0$

$$\begin{array}{r|rrrrr} 1 & 3 & -11 & -7 & 11 & 4 \\ & & 3 & -8 & -15 & -4 \\ \hline & 3 & -8 & -15 & -4 & 0 \end{array}$$

$$(x - 1)(3x^3 - 8x^2 - 15x - 4)$$

$$\begin{array}{r|rrrr} -1 & 3 & -8 & -15 & -4 \\ & & -3 & 11 & 4 \\ \hline & 3 & -11 & -4 & 0 \end{array}$$

$$(x - 1)(x + 1)(3x^2 - 11x - 4)$$

$$(x - 1)(x + 1)(3x + 1)(x - 4)$$

$x = 1, -1, -\frac{1}{3}, 4$