Math 140    Hw 20    Worked examples of selected recommended problems.

(1) Graph over one period (period doesn't have to start at 0). (2) List the x-intercepts. (3) List both coordinates of the highest and lowest points. Get the box from the amplitude, period and phase shift.

A. \( y = \sin(3x + \frac{\pi}{2}) \) First rewrite in the form \( A\sin(B(x-C)) \).
   \[ y = \sin(3(x - \frac{\pi}{6})) \]

x-intercepts: \(-\pi/6, \pi/6, \pi/2\)  (answers depend on choice of interval)
max point: \((0, 1)\)  period: \(2\pi/3\)
min point: \((\pi/3, -1)\)  phase shift: \(-\pi/6\)

B. \( y = \cos(x - \frac{\pi}{2}) \)

x-intercepts: \(\pi, 2\pi\)  (answer varies with choice of interval) \( y = \sin(x) \).
max points: \((\pi/2, 1), (5\pi/2, 1)\)  period: \(2\pi\)
min point: \((3\pi/2, -1)\)  shift: \(\pi/2\)

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Graph over one period. (2) List the x-intercepts. (3) List the vertical asymptotes.

C. \( y = -\tan(x + \frac{\pi}{4}) \)

\( x \)-intercept: \(-\frac{\pi}{4}\)

vertical asymptotes: \( x = -\frac{3\pi}{4}, x = \frac{\pi}{4} \)

E. Put (a) and (b) on the same graph.

First rewrite with the argument in the form: \( B(x \pm C) \)

(a) \( y = -3\cos(2\pi x - \frac{\pi}{4}) \)

\( y = -3\cos(2\pi(x - \frac{1}{8})), p = 1 \)

(b) \( y = -3\sec(2\pi x - \frac{\pi}{4}) \)

\( y = -3\sec(2\pi(x - \frac{1}{8})) \)

You can start the period at \( \frac{1}{8} \) or anywhere you like.

\(-3\cos(2\pi x - \pi/4): \) \( x \)-intercepts: \(-1/8, 3/8, 7/8, ... \)

\(-3\sec(2\pi x - \pi/4): \) vertical asymptotes: \( x = -1/8, x = 3/8, ... \)