PROBLEMS AND SOLUTIONS
GRAPHS OF TANGENT, COTANGENT, SECANT, AND COSECANT FUNCTIONS
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Please Send Questions and Comments to ingrid.stewart@csn.edu. Thank you!

PLEASE NOTE THAT YOU CANNOT ALWAYS USE A CALCULATOR ON THE ACCUPLACER - COLLEGE-LEVEL MATHEMATICS TEST! YOU MUST BE ABLE TO DO SOME PROBLEMS WITHOUT A CALCULATOR!

Problem 1:

Given $f(x) = 2\cot(2x)$, do the following:

a. state the **EXACT** period
b. graph the function on the interval $(-\pi, \pi)$
c. find the equations of the *vertical asymptotes* using the graph
d. find the **EXACT** coordinates of the x-intercepts using the graph
e. find the **EXACT** coordinates of the points at the end of the first and third interval of each period using the graph
f. find $f(\pi/6)$ rounded to four decimal places

Problem 2:

Given is the function $g(x) = 2\tan\left(\frac{\pi x}{4}\right)$, do the following:

a. state the **EXACT** period
b. graph the function on the interval ***[-8, 8]***
c. find the equations of the *vertical asymptotes* using the graph
d. find the **EXACT** coordinates of the x-intercepts using the graph
e. find the **EXACT** coordinates of the points at the end of the first and third interval of each period using the graph
f. find $g(\pi/6)$ rounded to four decimal places

Problem 3:

Given is the function $y = 2\tan(4x)$, do the following:

a. state the **EXACT** period
b. graph the function on the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
c. find the equations of the *vertical asymptotes* using the graph
d. find the **EXACT** coordinates of the x-intercepts using the graph
e. find the **EXACT** coordinates of the points at the end of the first and third interval of each period using the graph

Problem 4:

Given $y = \cot\left(\frac{\pi x}{3}\right)$, do the following:

a. state the **EXACT** period
b. graph the function on the interval ***(-6, 6)***
c. find the equations of the *vertical asymptotes* using the graph
d. find the **EXACT** coordinates of the x-intercepts using the graph
e. find the **EXACT** coordinates of the points at the end of the first and third interval of each period using the graph

SOLUTIONS

You can find detailed solutions below the link for this problem set!

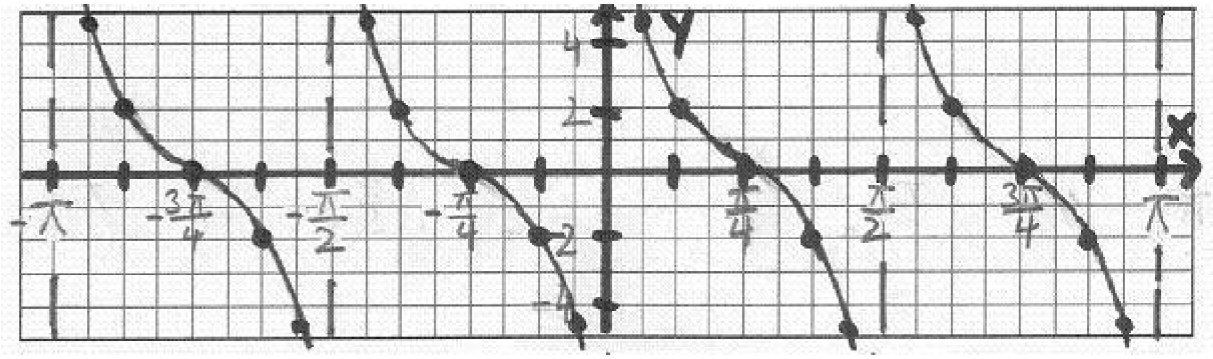
Problem 1:

a. Period: $\pi/2$

b. Graph of the function on the interval $(-\pi, \pi)$:

1. **Please note the concavities of the graphs of the tangent and cotangent functions.**

2. **Also, each branch continues to head toward the vertical asymptotes without ever "getting there." Do not draw the branches parallel to the asymptotes!**



c. Equations of the *vertical asymptotes* using the graph

x = -π ***x = -π/2*** ***x = 0*** ***x = π/2*** ***x = π***

d. **EXACT** coordinates of the x-intercepts using the graph

(-3π/4, 0), (-π/4, 0), (π/4, 0), (3π/4, 0)

e. **EXACT** coordinates of the points at the end of the first and third interval of each period using the graph

(-7π/8, 2), (-5π/8, -2), (-3π/8, 2), (-π/8, -2),

(π/8, 2), (3π/8, -2), (5π/8, 2), (7π/8, -2)

f. $f(\pi/6) \approx 1.15$

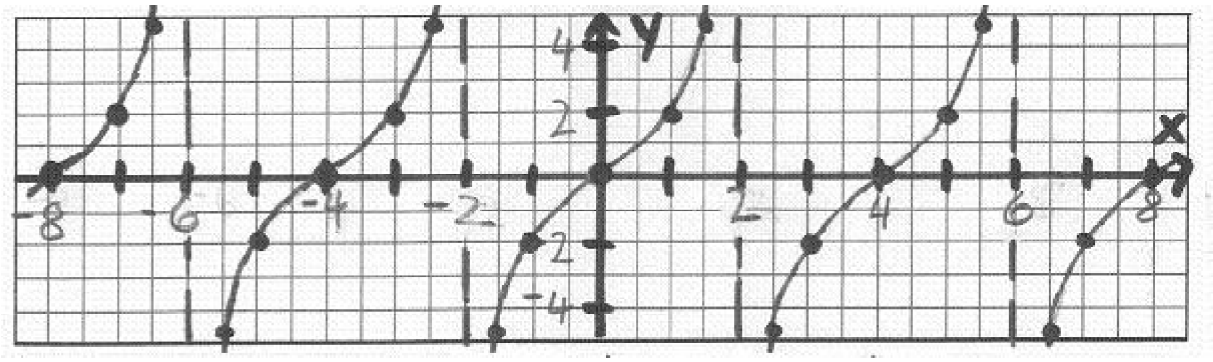
Problem 2:

a. Period: ***4***

b. Graph of the function on the interval ***[-8, 8]***:

1. **Please note the concavities of the graphs of the tangent and cotangent functions.**

2. **Also, each branch continues to head toward the vertical asymptotes without ever "getting there." Do not draw the branches parallel to the asymptotes!**



c. Equations of the *vertical asymptotes* using the graph

x = -6 ***x = -2*** ***x = 2*** ***x = 6***

d. **EXACT** coordinates of the x-intercepts using the graph

(-8, 0), (-4, 0), (0, 0), (4, 0), (8, 0)

e. **EXACT** coordinates of the points at the end of the first and third interval of each period using the graph

(-7, 2), (-5, -2), (-3, 2), (-1, -2), (1, 2), (3, -2), (5, 2), (7, -2)

f. $g(\pi/6) \approx 0.872$

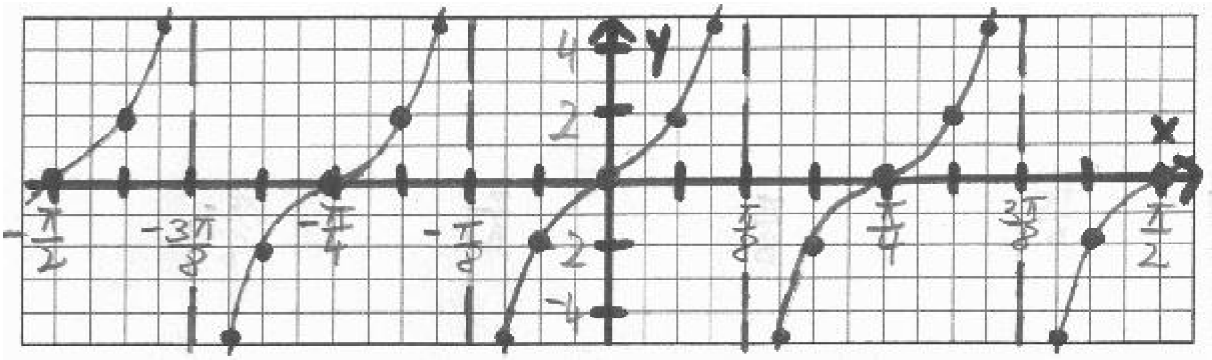
Problem 3:

a. Period: $\pi/4$

b. Graph of the function on the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$:

1. **Please note the concavities of the graphs of the tangent and cotangent functions.**

2. **Also, each branch continues to head toward the vertical asymptotes without ever "getting there." Do not draw the branches parallel to the asymptotes!**



c. Equations of the *vertical asymptotes* using the graph

x = -3π/8 ***x = -π/8*** ***x = 0*** ***x = π/8*** ***x = 3π/8***

d. **EXACT** coordinates of the x-intercepts using the graph

(-π/2, 0), (-π/4, 0), (0, 0), (π/4, 0), (π/2, 0)

e. **EXACT** coordinates of the points at the end of the first and third interval of each period using the graph

(-7π/16, 2), (-5π/16, -2), (-3π/16, 2), (-π/16, -2)

(π/16, 2), (3π/16, -2), (5π/16, 2), (7π/16, -2)

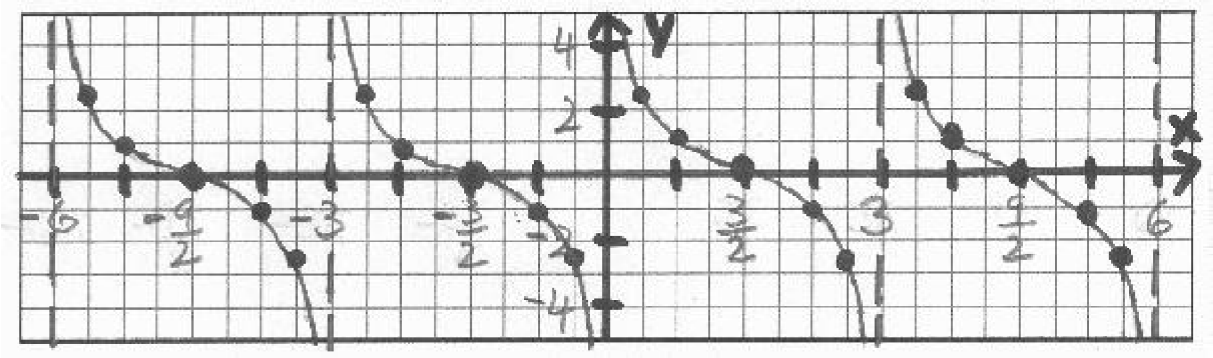
Problem 4:

a. Period: ***3***

b. Graph of the function on the interval ***(-6, 6)***:

1. **Please note the concavities of the graphs of the tangent and cotangent functions.**

2. **Also, each branch continues to head toward the vertical asymptotes without ever "getting there." Do not draw the branches parallel to the asymptotes!**



c. Equations of the *vertical asymptotes* using the graph

x = -6 ***x = -3*** ***x = 0*** ***x = 3*** ***x = 6***

d. **EXACT** coordinates of the x-intercepts using the graph

(-9/2, 0), (-3/2, 0), (3/2, 0), (9/2, 0)

e. **EXACT** coordinates of the points at the end of the first and third interval of each period using the graph

(21/4, 1), (-15/4, -1), (-9/4, 1), (-3/4, -1)

(3/4, 1), (9/4, -1), (15/4, 1), (21/4, -1)