1) **Complete the square of the following equation and factor. That is, complete the square and then write the equation in the form $\left(x + \frac{b}{2}\right)^2 = c$. Do <u>not</u> solve the equation.**

$$x^2 + 8x - 5 = 0 \longrightarrow x^2 + 8x = 5 \longrightarrow$$ need this form to complete the square

add $\left(\frac{b}{2}\right)^2 = \left(\frac{8}{2}\right)^2 = 16$ to both sides

$$x^2 + 8x + 16 = 16 + 5 \longrightarrow \text{factor}$$

$$(x + 4)^2 = 21$$

2) **Solve the following equation:**

$$|4x - 2| = 6$$

$4x - 2 = 6$ or $4x - 2 = -6$

$4x = 8$ or $4x = -4$

$\boxed{x = 2}$ or $\boxed{x = -1}$

1.7

Section 1.7/1.8 Quiz

Write your name on the back

1) Determine the values for which the following inequality is satisfied. Write your answer in interval notation

$$\frac{3x-3}{x+2} \geq 0$$

>0

<0

Numerator $= 0$ when $\boxed{x = 1}$

Denominator $= 0$ when $\boxed{x = -2}$

$(-\infty, -2)$, $(-2, 1)$, $(1, \infty)$

$-3 \quad 0 \quad 2$

↳ test values

$\underline{x=-3}$: $\frac{-12}{-1} = 12 > 0$ $\quad$ $x = 2$: $\frac{3}{4} > 0$

$\underline{x=0}$: $-\frac{3}{2} < 0$

$$\boxed{(-\infty, -2) \cup [1, \infty)}$$

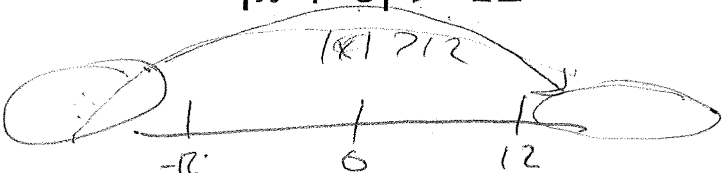
$(1, \infty)$

2) Determine the values for which the following inequality is satisfied. Write your answer in interval notation

$$|x+6| > 12$$

$x + 6 > 12$ or $x + 6 < -12$

$$\boxed{x > 6 \text{ or } x < -18}$$



$x \in$ ~~[6,~~

$(-\infty, -18) \cup (6, \infty)$

$x = 6$

$|12| = 12$

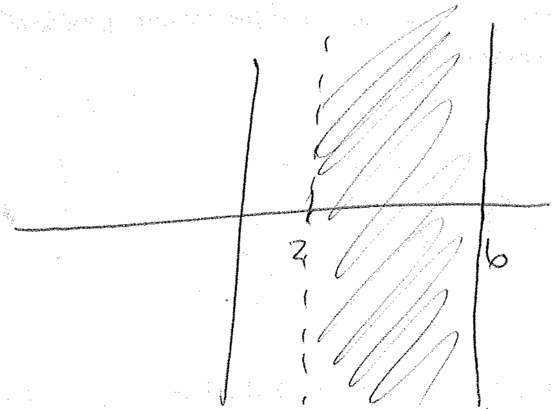
$\not> 12$

Section 1.7/1.8 Quiz

Write your name on the back

3) **Graph the region describe below.**

$$\{(x, y) | 2 < x \leq 6\}$$



4) **Find the X and Y intercepts of the following equation:**

$$x^3 + 2y = 8$$

X-int

Set y=0

$x^3 = 8$

$\Rightarrow \boxed{x=2}$

y int

Set x=0

$2y=8$

$\boxed{y=4}$

Section 2.1 Quiz

Write your name on the back

1) Find the domain and range of the following function. Express your answer in Interval Notation

$$f(x) = \sqrt{4 + x}$$

Domain: need $4+x \geq 0$

$\Rightarrow x \geq -4$

$[-4, \infty)$

Range: $\sqrt{\text{anything}} \geq 0$

$[0, \infty)$

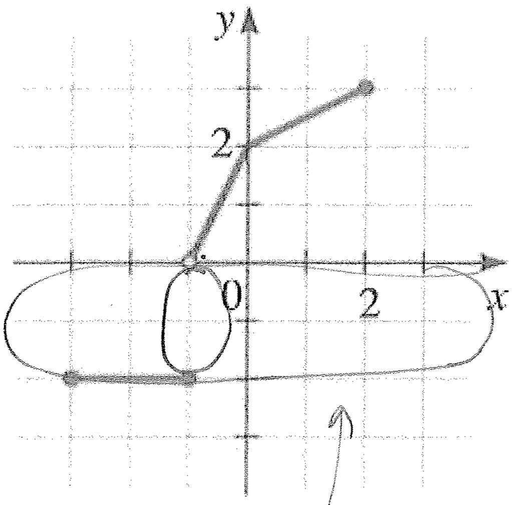
2) Write down and simplify $f(a + h)$

Plug in a+h into x in the above function

$F(a+h) = \sqrt{4 + a + h}$

Section 2.2/2.3 Quiz

Write your name on the back



No y values between -2 and 0

Consider the graph shown to the left to answer the following questions

1) Write the range using <u>interval notation</u>

"Where are the y-values?" – $\{-2\} \cup (0,3]$

2) Write the domain using <u>interval notation</u>

"where are the x values?" – $[-3,2]$

3) f(-1)= -2

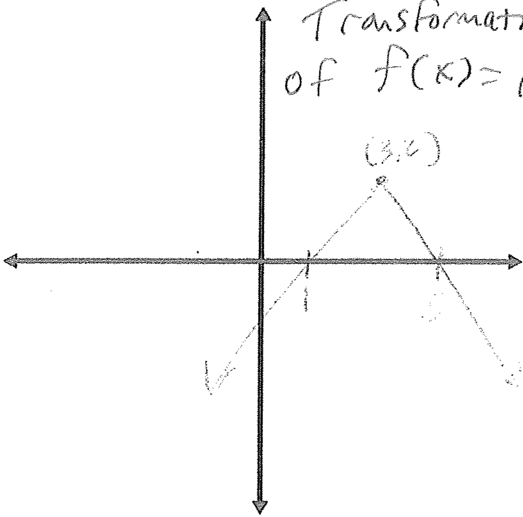
4) Using the vertical line test from section 2.2, is the graph depicting a function? **Explain...**

No matter where you draw a vertical line it only touches the graph once. This shows how each x-value corresponds to a single y-value which is the definition of a function.

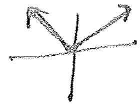
Section 2.5 Quiz **Write your name on the back**

1) Write the equation for the following transformation

Transformation of $f(x) = |x|$



$|x|$

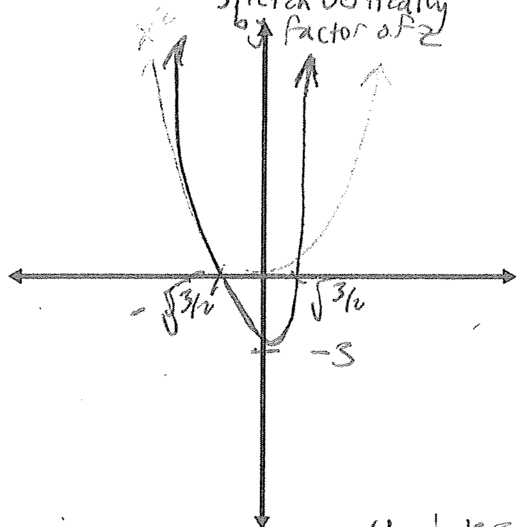


$f(x) = \underbrace{-}_{\text{flips } |x| \text{ upside down}} |\underbrace{x-3}_{\text{shifts } |x| \text{ right 3 units}}| \underbrace{+ 2}_{\text{moves } |x| \text{ up 2 units}}$

2) Graph the following transformation of x^2

$f(x) = \underbrace{2}_{\text{Stretch vertically by factor of 2}}x^2 \underbrace{- 3}_{\text{Shift down 2 units}}$

Shift x down 2 units



X Intercepts

Set $y=0$: $0 = 2x^2 - 3$

$2x^2 = 3$

$x^2 = \frac{3}{2}$

$x = \pm\sqrt{\frac{3}{2}}$

y intercept

Set $x=0$: $y = -3$

Section 2.6 Quiz Write your name on the back

Let $f(x) = \frac{1}{\sqrt{x}}$ and $g(x) = x - 2$

1) Find $f(g(x))$

$f(g(x)) = \frac{1}{\sqrt{x-2}}$

↳ plug g(x) into the x in f(x)

2) Find $g(f(x))$

$g(f(x)) = \frac{1}{\sqrt{x}} - 2$

↳ plug f(x) into the x in g(x)

3) Calculate $g(f(4))$ and simplify your answer

$g(f(4)) = \frac{1}{\sqrt{4}} - 2 = \frac{1}{2} - 2 = \frac{1}{2} - \frac{4}{2} = -\frac{3}{2}$

Section 2.7 Quiz

Write your name on the back

1) Is the function $f(x) = |x|$ a one-to-one function? If so, explain how you know. If not, provide a counterexample illustrating why it is not one-to-one.

One-to-one functions have each y-value corresponding to a single x-value

$F(x) = |x|$ is Not one-to-one since $f(-1) = f(1) = 1 \rightarrow$ 2 x values correspond to same y

In general, $f(-x) = f(x) = |x|$. This can be seen by noting how the graph fails the horizontal line test

2) Use the inverse function property to show that the following functions are each other's inverse: $f(x) = \frac{3x-5}{5}$ and $g(x) = \frac{5}{3}x + \frac{5}{3}$

Check $g(f(x))$

$$g(f(x)) = \frac{5}{3}\left(\frac{3x-5}{5}\right) + \frac{5}{3} = \frac{1}{3}(3x-5) + \frac{5}{3}$$

$$= x - \frac{5}{3} + \frac{5}{3} = x$$

also $f(g(x)) = x$

Section 3.2 Quiz   Write your name on the back

Sketch the graph of the polynomial function. Make sure your graph shows all intercepts and exhibits the proper end behavior.

$$f(x) = x^4 + 4x^3$$

Factor to see where $f(x)=0$

① $f(x) = x^3(x+4) = 0$

if $\boxed{x=0, \; x=-4}$

② Test points between 0 and -4 to see if the graph is positive or negative

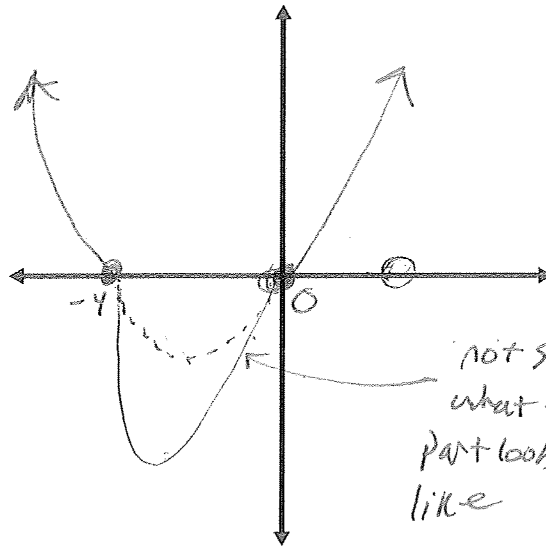
I choose $x=-1$: $f(-1) = (-1)^4 + 4(-1)^3 = -3$

$\Rightarrow$ graph negative between 0 and -4

③ End behavior:

F(x) is degree 4 (even) so both ends point in the same direction

Since the x^4 term is positive, the ends point up



not sure what this part looks like

Section 3.3 Quiz Write your name on the back

Find the quotient and remainder of the following expression. Write your answer in the form $P(x) = D(x) \cdot Q(x) + R(x)$.

$$\frac{x^3+3x^2+4x+3}{3x+6}$$

$$\begin{array}{r} \frac{1}{3}x^2 + \frac{1}{3}x + \frac{2}{3} \\ 3x+6 \enclose{longdiv}{x^3+3x^2+4x+3} \\ -\ x^3+2x^2 \qquad\qquad \\ \hline 0x^3+x^2+4x \qquad \\ x^2+2x \qquad \\ \hline 0x^2+2x+3 \\ 2x+4 \\ \hline -1 \end{array}$$

remainder

P(x) D(x)·Q(x) R(x

$$x^3+3x^2+4x+3 = (3x+6)\left(\tfrac{1}{3}x^2+\tfrac{1}{3}x+\tfrac{2}{3}\right) - 1$$

Section 3.7 Quiz   **Write your name on the back**

For each of the following two functions, find the X-intercept, Y-intercept, horizontal asymptotes and vertical asymptotes. **Show your work.**

a) $\frac{5x^0}{x-2}$

For x-intercept:
Set $y=0$: $0 = \frac{5}{x-2}$
true if $\boxed{0=5}$ → doesn't make sense
So there is no x-intercept

For y-intercept: Set $x=0$: $\boxed{y=\frac{5}{-2}}$ → y intercept

Horizontal Asymptote: $n=0$, $m=1$. $n<m$ ⇒ case 1
case 1 ⇒ Hor. Asy: at $\boxed{y=0}$

Vertical Asymptote: Set denominator $=0$
$x-2=0$ if $\boxed{x=2}$

X-Int: Does not exist (DNE)

Y-Int. $(0, -\frac{5}{2})$

Horizontal Asy.: $y=0$

Vertical Asym: $x=2$

b) $\frac{16x^2-1}{(2x-8)(x+1)}$

X int: $16x^2-1=0$
$x^2 = 1/16$
$x = \pm\sqrt{1/16} = \frac{\pm\sqrt{1}}{\sqrt{16}} = \pm\frac{1}{4}$

y int: $x=0$: $\frac{-1}{(-8)(1)} = \frac{1}{8}$

Hor asym: $n=2$, $m=2$
⇒ case 2 ⇒ Hor asy at
$y = \frac{16}{2} = 8$

Vert asym: $(2x-8)(x+1)=0$
if $x=4$ or $x=-1$

X-Int: $(\pm\frac{1}{4}, 0)$

Y-Int: $(0, 1/8)$

Horizontal Asy.: $y=8$

Vertical Asym: $x=4$, $x=-1$

Section 4.1-4.3 Quiz Write your name on the back

1) From 4.1&4.2:Suppose $y = a^x$ for some base a and that the function passes through the point (3,27). Find the value of a.

(x,y)

What raised to the 3rd power is 27?

$27 = a^3 \rightarrow$ A: 3 $\Rightarrow$ $a = 3$

2) From 4.3: Express the following equation in exponential form: $\log_3 81 = 4$

$\log_a x = y \Leftrightarrow a^y = x$

So $\log_3 81 = 4 \Leftrightarrow 3^4 = 81$

3) Evaluate $\log_{100} 1 =$

$100^x = 1 \rightarrow$ 100 raised to what power is 1? $\Rightarrow 0$

$\Rightarrow x = 0$

4) Use the definition of a logarithm to find x: $\log_4 2 = x$

$4^x = 2 \rightarrow$ 4 raised to what power is 2?

$\sqrt{4} = 2 \Rightarrow 4^{1/2} = 2 \Rightarrow x = 1/2$

Section 4.4 & 4.5 Quiz Write your name on the back

1) Use the Laws of Logarithms to combine the expression. Simplify your answer.

$\ln 4 + \frac{1}{2}\ln 16 - \ln 2 = \ln 4 + \ln(\sqrt{16}) - \ln 2$

$= \ln(4\cdot\sqrt{16}) - \ln(2) = \ln\left(\frac{4\cdot\sqrt{16}}{2}\right) = \boxed{\ln(8) \text{ or } \log_e(8)}$

2) Use the Laws of Logarithms to expand the expression and eliminate any exponents.

$\log\frac{x^3y^4}{z^6} = \log(x^3y^4) - \log(z^6)$

$= \log(x^3) + \log(y^4) - \log(z^6)$

$= \boxed{3\log(x) + 4\log(y) - 6\log(z)}$

3) Solve the following equation for x. You should get a whole number as an answer.

$e^{8-4x} = 1$ → take loga of both sides. Any log works but ln is best

$\ln(e^{8-4x}) = \underbrace{\ln(1)}_{=0}$

$8 - 4x = 0$

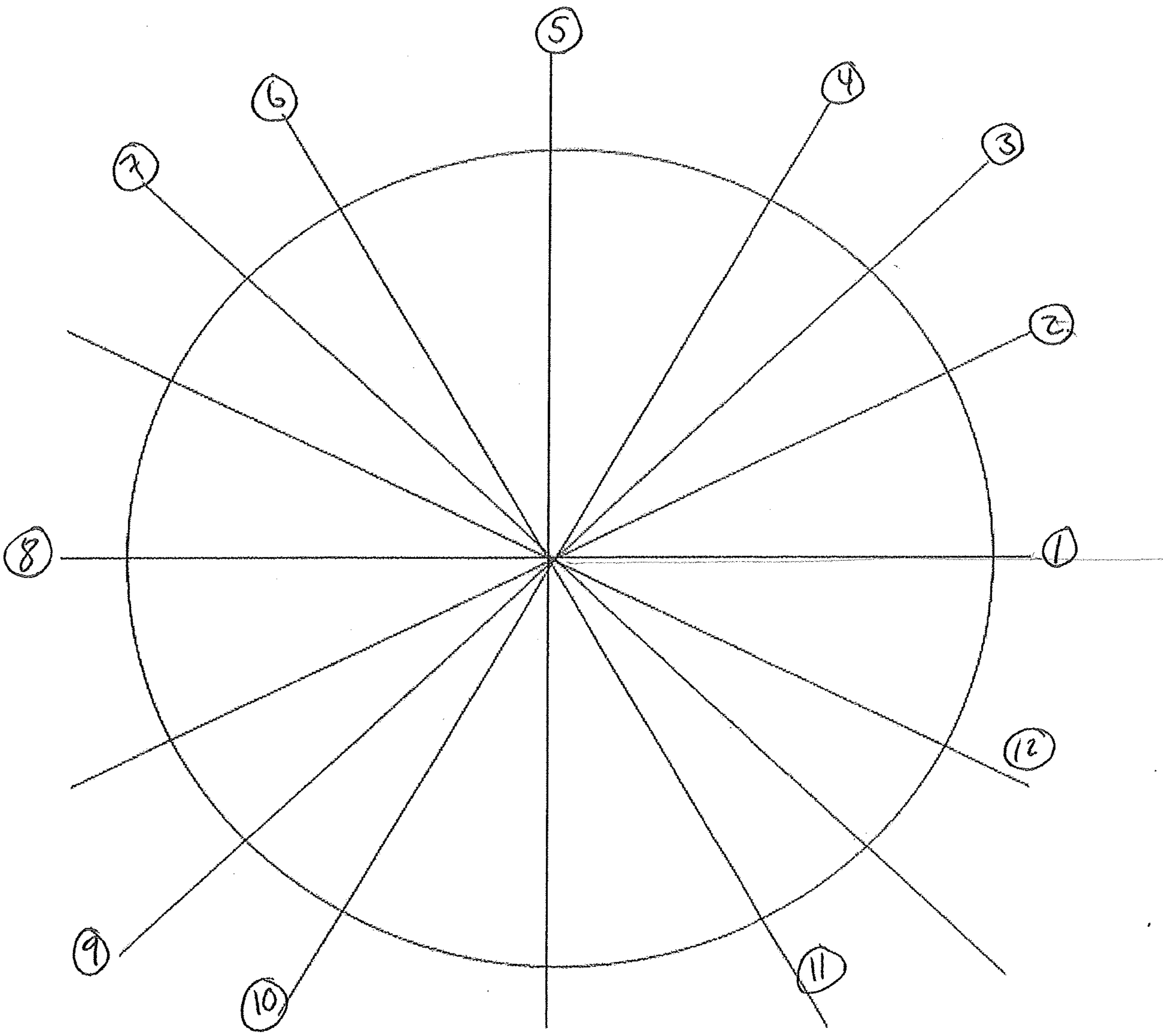
$8 = 4x$

$\boxed{2 = x}$

Check: $e^{8-4\cdot 2} = e^{8-8} = e^{0} = 1$ ✓

Unit Circle Quiz **Write your name on back**

Consider the following unit circle and fill in the 12 missing pieces at the bottom of the page. Some questions ask for t values, some ask for (x,y) values and some require both.



1. $t = 0, 2\pi$
   $(x,y) = (1,0)$

2. $t = \pi/6, -11\pi/6$
   $(x,y) = (\frac{\sqrt{3}}{2}, \frac{1}{2})$

3. $t = \pi/4, -\frac{7\pi}{4}$
   $(x,y) = (\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$

4. $t = \pi/3$ or $-\frac{5\pi}{3}$
   $(x,y) = (\frac{1}{2}, \frac{\sqrt{3}}{2})$

5. $t = \pi/2$ or $-\frac{3\pi}{2}$
   $(x,y) = (0,1)$

6. $t = \frac{2}{3}\pi$ or $-4/3\pi$
   $(x,y) = (-\frac{1}{2}, \frac{\sqrt{3}}{2})$

7. $t = \frac{3\pi}{4}$ or $-5\pi/4$
   $(x,y) = (-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$

8. $t = \pi$ or $-\pi$
   $(x,y) = (-1,0)$

9. $t = \frac{5\pi}{4}$ or $-\frac{3\pi}{4}$
   $(x,y) = (-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

10. $t = \frac{4\pi}{3}$ or $-\frac{2\pi}{3}$
    $(x,y) = (-\frac{1}{2}, -\frac{\sqrt{3}}{2})$

11. $t = \frac{5\pi}{3}$ or $-\frac{\pi}{3}$
    $(x,y) = (\frac{1}{2}, -\frac{\sqrt{3}}{2})$

12. $t = \frac{11\pi}{6}$ or $-\frac{\pi}{6}$
    $(x,y) = (\frac{\sqrt{3}}{2}, -\frac{1}{2})$

Section 5.2 Quiz

Write your name on the back

1) Find the exact values of $\cos(\frac{5\pi}{6})$ and $\tan(\frac{5\pi}{6})$.

$\frac{5\pi}{6}$ has terminal point $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

(x, y)

$\cos\left(\frac{5\pi}{6}\right) = x = -\frac{\sqrt{3}}{2}$

$\tan\left(\frac{5\pi}{6}\right) = \frac{y}{x} = \frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{1}{2} \div \frac{2}{\sqrt{3}} = -\frac{1}{\sqrt{3}}$

2) Determine the sign of $(\sin t \cdot \cos t)$ given that t is in Quadrant II

$\sin t = y$, $\cos t = x$. In Quad II, $x < 0$, $y > 0$

so $\sin t \cdot \cos t$ in Quad II is $+ \cdot - = -$ (negative)

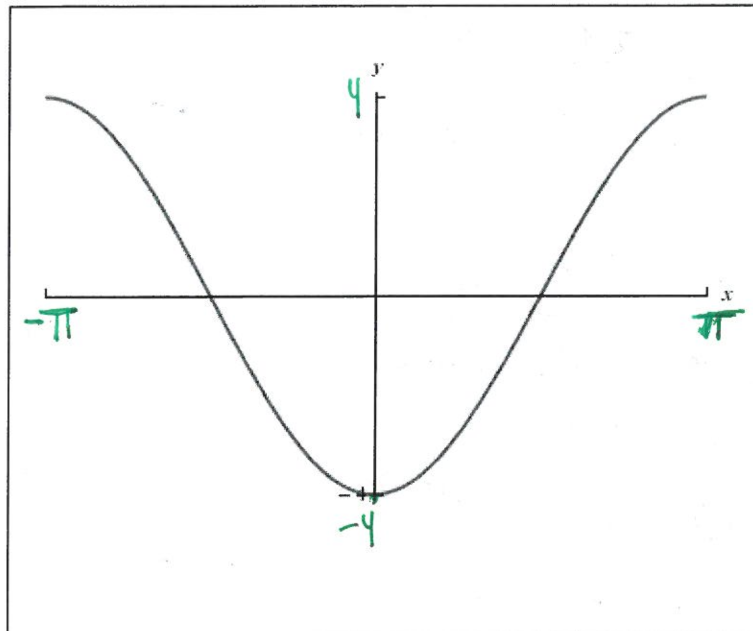
3) Write $\tan t$ in terms of $\sin t$ given that t is in Quadrant IV. Hint: $\cos t = \pm\sqrt{1 - \sin^2 t}$

$\tan t = \frac{\sin t}{\cos t} = \frac{\sin t}{\pm\sqrt{1 - \sin^2 t}}$. In Quad IV, $\cos > 0$ so use $+\sqrt{1 - \sin^2 t}$

$\Longrightarrow \tan t = \frac{\sin t}{+\sqrt{1 - \sin^2 t}}$

Section 5.3 Quiz Name

2) Determine the period, amplitude and phase shift of the following graph. You **do not** need to write the equation of the graph.



Period- 2π

(distance between start and end of one period)

Amplitude- 4

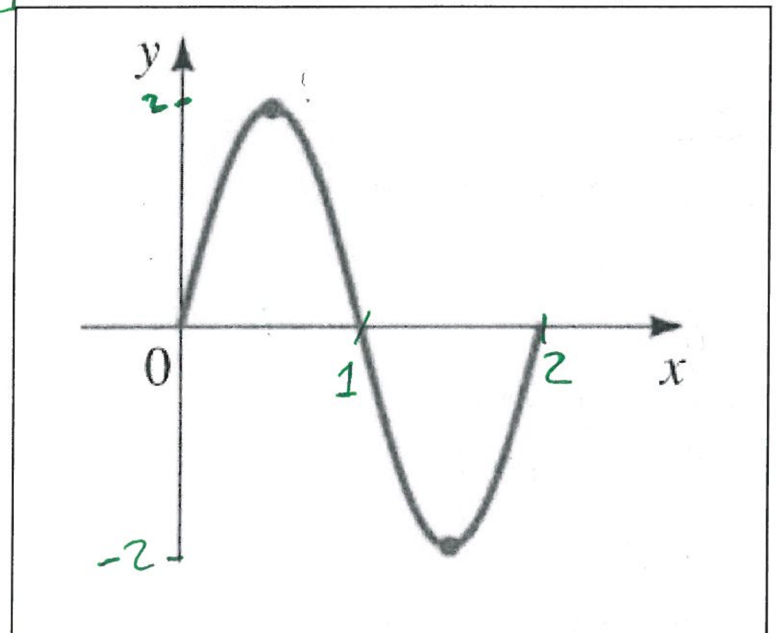
(How high the graph is above/below the mid point)

Phase Shift- $-\pi$

(usually cos starts at the y-axis. Here, it starts π to the left of the y-axis)

Section 5.3 Quiz Name

1) Determine the Equation of the following graph. Include the period, amplitude and phase shift.



Period- 2 $\Rightarrow \frac{2\pi}{K} = 2 \Rightarrow \boxed{K = \pi}$

(Distance between the start and end of one period)

Amplitude- 2 $\Rightarrow \boxed{a = 2}$

(How high the graph is above/below the midpoint)

Phase Shift- 0 /None $\Rightarrow \boxed{b = 0}$

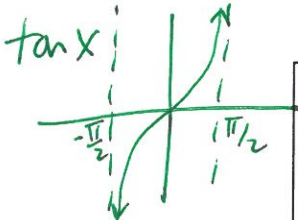
(Sin usually starts at the origin)

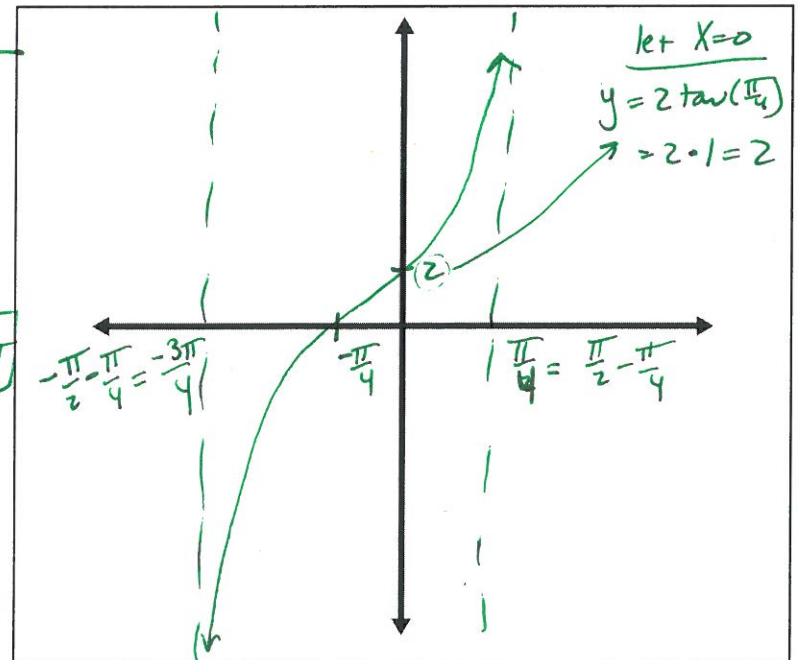
$\boxed{a\sin(K(x-b)) = 2\sin(\pi(x-0)) = 2\sin(\pi x)}$

Section 5.4 Quiz **Write your name on the back**

1) Graph the following equation. Include the period and phase shift

$2\tan(x+\frac{\pi}{4})$





Period

For tan kx, period $=\frac{\pi}{k}$

here, $k=1$ so $\boxed{\text{period}=\frac{\pi}{k}=\frac{\pi}{1}=\pi}$

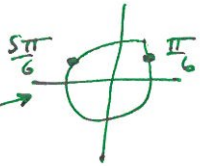
Phase Shift $-\frac{\pi}{4}$

ie, $\frac{\pi}{4}$ units to the left

$\Rightarrow$ everything moves w/ it

Section 5.5 Quiz **Write your name on the back**

1) $\sin^{-1}(\frac{1}{2}) = \frac{\pi}{6}$



$\sin t = y = \frac{1}{2}$ where on the unit circle?

need $t \in [-\frac{\pi}{2}, \frac{\pi}{2}]$ so choose $\frac{\pi}{6} = t$

2) $\cos^{-1}(1) = 0$

$\cos t = x = 1$ where on the unit circle?

$t = 0, 2\pi, 4\pi$ etc

need $t \in [0, \pi]$ so choose $t = 0$

3) ~~$\tan^{-1}(\frac{\sqrt{3}}{2}) =$~~

$\boxed{\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right) = -\frac{\pi}{6}}$

$\tan t = \frac{y}{x} = -\frac{1}{\sqrt{3}}$ where on the unit circle?

need $y = x \cdot -\frac{1}{\sqrt{3}} \Rightarrow \left| y = \frac{1}{2}, x = \frac{\sqrt{3}}{2} \right|$

occurs at $t = -\frac{\pi}{6}$

4) $\sin^{-1}(\sin(\frac{\pi}{2})) = \frac{\pi}{2}$ provided $\frac{\pi}{2} \in [-\frac{\pi}{2}, \frac{\pi}{2}]$

$\frac{\pi}{2}$ is in $[-\frac{\pi}{2}, \frac{\pi}{2}]$

so $\sin^{-1}(\sin(\frac{\pi}{2})) = \frac{\pi}{2}$

5) $\cos(\cos^{-1}(4)) = 4$ provided $4 \in [-1, 1]$.

$4 \notin [-1, 1]$ so

$\cos(\cos^{-1}(4))$ Does not exist

6) $\tan(\tan^{-1}(\pi e^2)) = \pi e^2$ provided

$\pi e^2 \in \mathbb{R}$

ie, πe^2 is a real number.

$\pi e^2 \in \mathbb{R}$ so $\tan(\tan^{-1}(\pi e^2)) = \pi e^2$

Section 6.1 Quiz　　　　Write your name on the back

1) Convert $\frac{\pi}{9}$ rad to a measurement in degrees.

$$\frac{\pi}{9}\text{ rad}\cdot\frac{180^\circ}{\pi\text{ rad}} = \frac{180^\circ}{9} = 20^\circ$$

2) Convert 3° to a measurement in radians.

$$3^\circ\cdot\frac{\pi\text{ rad}}{180^\circ} = \frac{3\pi}{180}\text{ rad} = \frac{\pi}{60}$$

3) Find the length of an arc that subtends a central angle of 3° in a circle of radius 10.

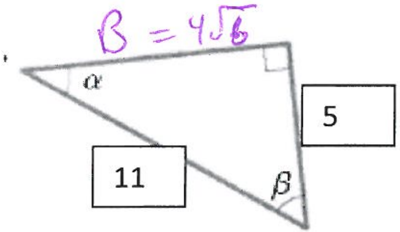
$S = r\theta \rightarrow$ to use this need θ in radians

$3^\circ = \frac{\pi}{60}$ rad from above

so $S = r\theta = 10\cdot\frac{\pi}{60} = \frac{\pi}{6}$

Section 6.2-6.3 Quiz   **Write your name on the back**

1) Find $\sin\beta$ and $\sin\alpha$ as they pertain to the triangle shown



Find 3rd side:

$5^2 + B^2 = 11^2$

$B^2 = 121 - 25$

$B = \sqrt{96} = 4\sqrt{6}$

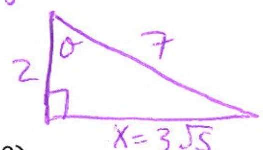
$\sin\theta = \frac{opp}{Hyp}$

So $\sin\alpha = \frac{5}{11}$

$\sin B = \frac{\sqrt{96}}{11} = \frac{4\sqrt{6}}{11}$

2) Sketch a right triangle with acute angle θ given that $\sec\theta = \frac{7}{2}$

$\sec\theta = \frac{Hyp}{adj}$ So Hyp = 7, adj = 2



$2^2 + x^2 = 7^2 \Rightarrow x = \sqrt{45} = 3\sqrt{5}$

3) Find cos(210°)

change 210° to radians:

$210° \cdot \frac{\pi}{180°} = \frac{21\pi}{18} = \frac{7\pi}{6}$

So $\cos(210°) = \cos\left(\frac{7\pi}{6}\right) = -\frac{\sqrt{3}}{2}$

Section 1.1 Quiz Write your name on the back

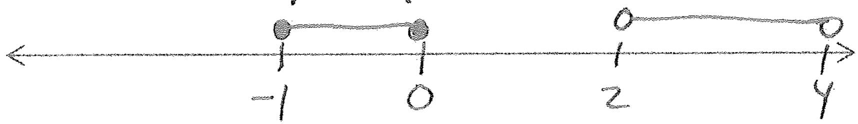
Key

1) Graph the following interval(s) on the given number line:

closed open

$[-1,0] \cup (2,4)$

5/5



2) Represent the following interval in set-builder notation: (0, 12]

5/5

$$\{\ x \mid 0 < x \leq 12\ \}$$