Exam #2: MAT182

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Instructions:

No books, notes, friends, or calculators. Sit in every other seat. You have 1 hour and 10 minutes for this exam. If you run out of space then write "see back" on the problem and write the problem number on the back and continue. One sheet of scratch paper is included on the last page. If something is unclear quietly come up and ask me.

Simplify all final answers. Show steps where appropriate (or I can't give partial credit). Unless indicated, angles are in radians. Answers should be given in radians for angles unless requested in degrees. **Circle all answers,** otherwise if it's unclear what your final answer is full credit will not be awarded.

[2 pts] 1. Write f(x) as a function of a positive angle:

$$f(x) = \tan(-2x)$$

tangent is an odd function $\therefore$

$$f(x) = -\tan 2x$$

[2 pts] 2. Write f(x) in terms of it's cofunction

$$f(x) = \sin(x)$$

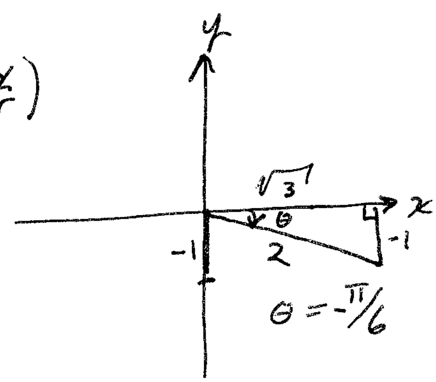
$$f(x) = \cos\left(\frac{\pi}{2} - x\right)$$

[2 pts] 3. Evaluate the given expression

$$\arcsin\left(\frac{-1}{2}\right) = \arcsin\left(\frac{y}{r}\right)$$

$$\therefore \frac{y}{r} = \frac{-1}{2}$$

$$= -\pi/6$$



4. Given the following function,

$$f(x) = \cos x$$

[2 pts] (a) The amplitude of f(x) is:

1

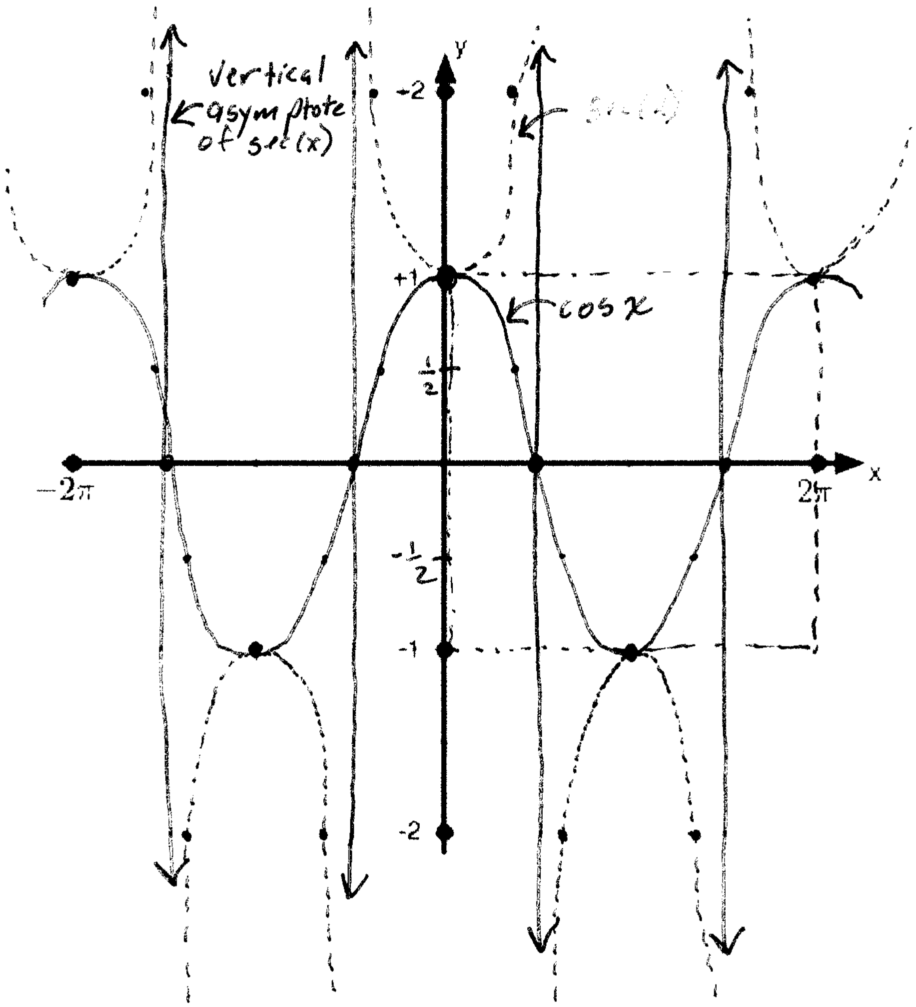
[2 pts] (b) The period of f(x) is:

2π

[2 pts] (c) Graph f(x) on the interval [-2π, 2π] as a **solid** line.

[2 pts] (d) On the same graph, plot $\sec(x)$ on the interval [-2π, 2π] using a **dashed** line.

[2 pts] (e) For the graph of $\sec(x)$, draw straight lines where the vertical asymptotes exist.



5. Given the following function f(x),

$$y = \frac{1}{2}\cos(2x) - 1$$

std form:

$$\underset{k}{y - (-1)} = \underset{a}{\frac{1}{2}} \cos \underset{b}{2} x$$

[2 pts] (a) The origin of f(x) is translated to (h, k) which is:

$(0, -1)$

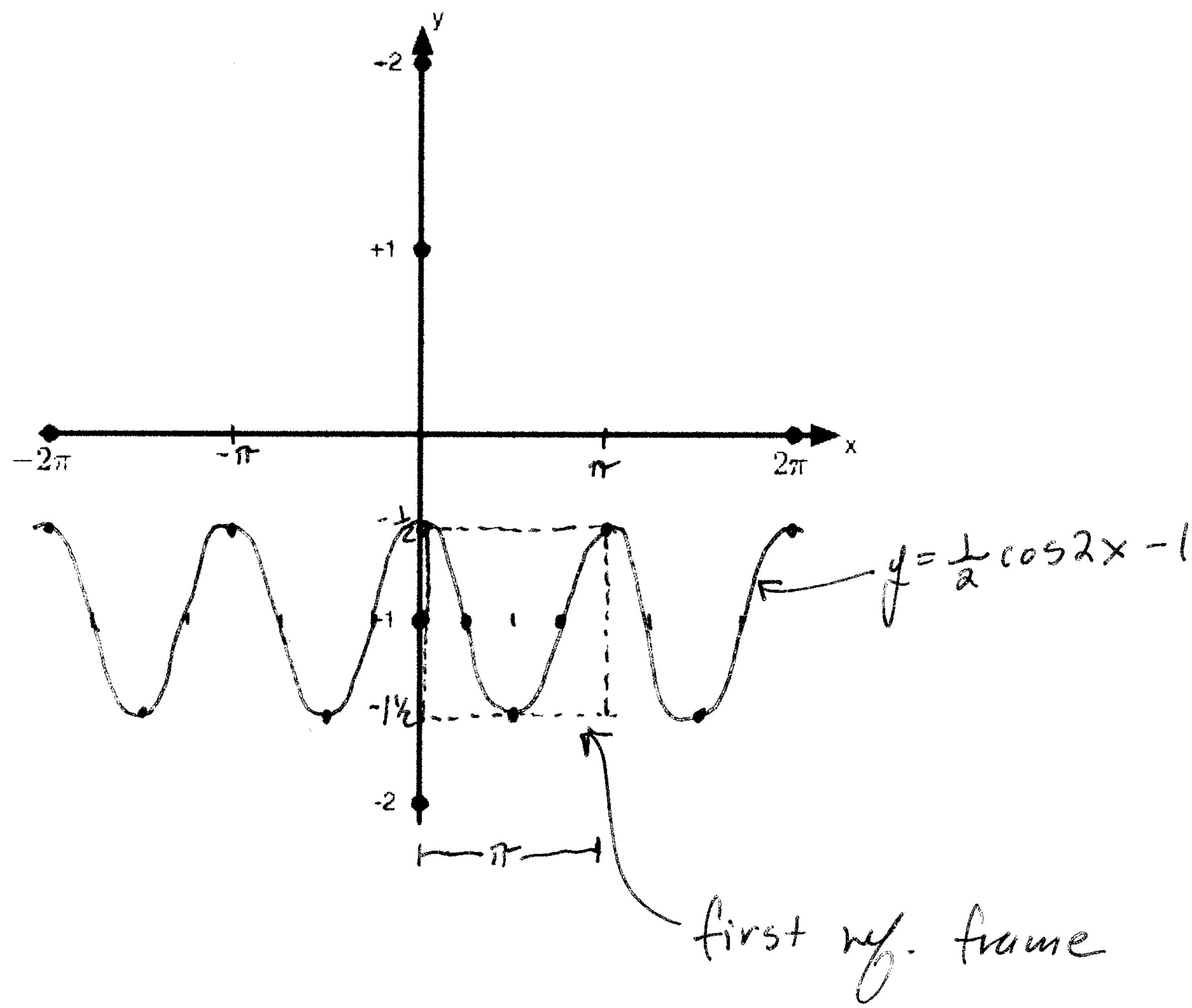
[2 pts] (b) The amplitude of f(x) is:

$\frac{1}{2}$

[2 pts] (c) The period of f(x) is:

$p = \frac{2\pi}{b} = \frac{2\pi}{2} = \pi$

[2 pts] (d) Graph f(x) on the interval [-2π, 2π] as a **solid** line.



[3 pts] 6. Prove the following identity:

$$\frac{\cos(\alpha-\beta)\sin\beta}{\cos\alpha\cos\beta\sin\beta+\sin\alpha\sin^2\beta} = 1$$

• start w/ left side

$$\frac{\cos(\alpha-\beta)\cdot\sin\beta}{\cos\alpha\cos\beta\sin\beta+\sin\alpha\sin^2\beta}$$

• factor $\sin\beta$ in denominator

$$= \frac{\cos(\alpha-\beta)\cdot\sin\beta}{(\cos\alpha\cos\beta+\sin\alpha\sin\beta)\sin\beta}$$

• expand $\cos(\alpha-\beta)$ w/ sum id.

$$= \frac{(\cos\alpha\cos\beta+\sin\alpha\sin\beta)\sin\beta}{(\cos\alpha\cos\beta+\sin\alpha\sin\beta)\sin\beta}$$

• Numerator ; denominator cancel

$= 1$ ✓

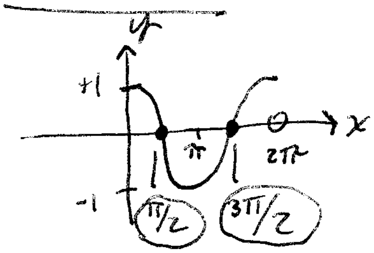
[3 pts] 7. Find the complete exact solution for the following expression: [assigned HW problem]

$$\cos x \ -2 \sin x \ \cos x \ = \ 0$$

$\cos x - 2\sin x \cos x = 0$

$\cos x\,(1 - 2\sin x) = 0$

$\cos x = 0$; $1 - 2\sin x = 0$



$x = \frac{\pi}{2} + n2\pi, \ \frac{3\pi}{2} + n2\pi$

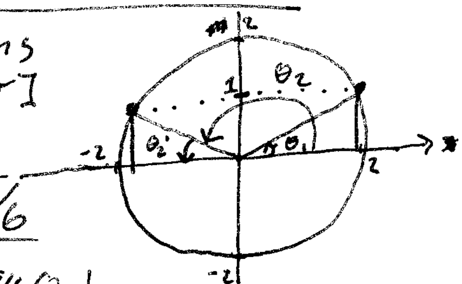
- can combine

$x = \frac{\pi}{2} + n\pi$

$-2\sin x = -1$

$\sin x = \frac{1}{2}$

• 2 solutions on $[0, 2\pi]$



$\theta_1 = \theta_2' = \pi/6$

$\theta_2 = \pi - \theta_2'$

$= \pi - \pi/6$

$= 5\pi/6$

$\therefore x = \pi/6 + n2\pi, \ \frac{5\pi}{6} + n2\pi$

Complete solution:

$$x = \frac{\pi}{2} + n\pi, \ \frac{\pi}{6} + n2\pi, \ \frac{5\pi}{6} + n2\pi$$

[Scratch paper]