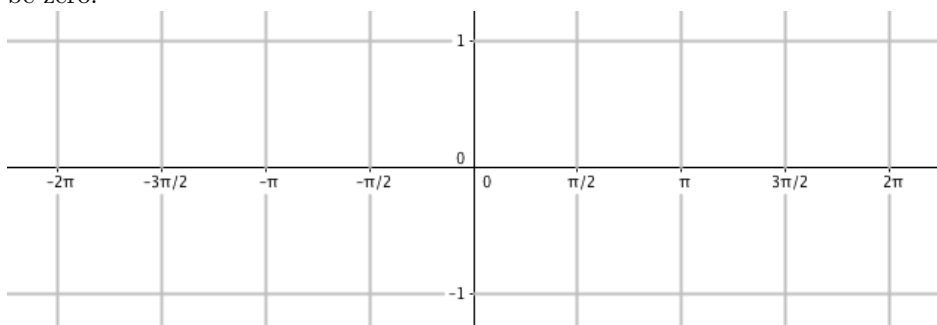
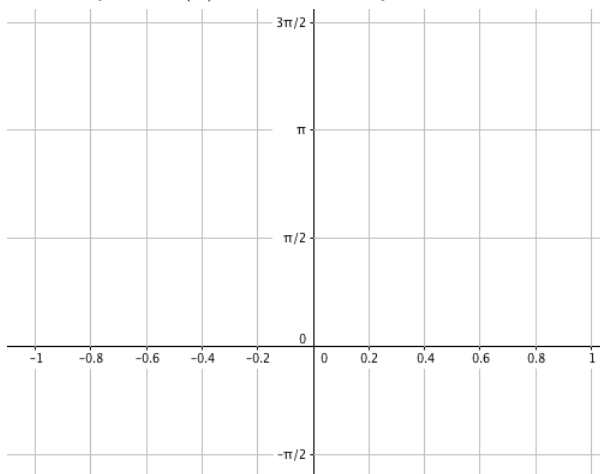


Math 131 - Study Session Problems

1. (a) Sketch the graph of $y = \cos(x)$. Use the graph to determine the points where the derivative of cosine will be zero.



- (b) Reflect $y = \cos(x)$ over the line $y = x$.



- (c) Use (b) to explain why $f(x) = \cos(x)$ is not invertible.

- (d) What is the largest interval $[0, a]$ on which $f(x) = \cos(x)$ is invertible?

- (e) If $y = \cos^{-1}(x)$, solve for x and use implicit differentiation to find $\frac{dy}{dx}$.

- (f) Use a right triangle to simplify $\sin(\cos^{-1}(x))$ and put your answer in terms of x . (Hint: substitute $\theta = \cos^{-1}(x)$.)

2. The sine and cosine function are related by a horizontal shift: $\cos(x) = \sin(x + \frac{\pi}{2})$. Use this to find the derivative of $\cos(x)$, using only the derivative of sine and derivative rules.
3. All of the other trigonometric functions (tan, sec, cot, csc) are defined as quotients involving sine and/or cosine. Calculate the derivatives of the following trig functions using only this fact and quotient rule.

(a) $\tan(x) = \frac{\sin(x)}{\cos(x)}$

(b) $\sec(x) = \frac{1}{\cos(x)}$

4. For the following compositions of functions $f(g(x))$, identify the outer function $f(x)$, the inner function $g(x)$, and the derivative $\frac{d}{dx} [f(g(x))]$

(a) $\tan(5x - 5)$

(b) $\cos^{-1}(10x)$

(c) $\sin^2(x)$