

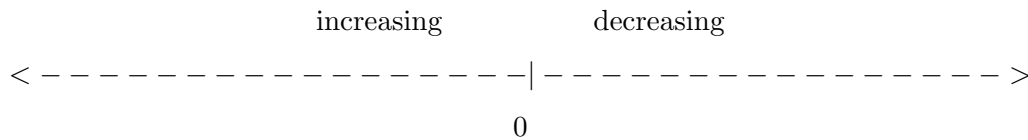
Complete the following problems. Show all work to receive full credit.

1. Use the function  $f(x) = \ln(\cos x)$  on the interval  $(-\frac{\pi}{2}, \frac{\pi}{2})$ .

(a) Where is  $f(x)$  decreasing?

$$f'(x) = \frac{-\sin x}{\cos x} = -\tan x$$

This is 0 when  $x = 0$ . Therefore we have:



So  $f$  is decreasing on the interval  $(0, \frac{\pi}{2})$ .

(b) Where are the local minima?

There is a local maximum at  $x = 0$ . There is no local minimum.

(c) Where is  $f(x)$  concave up?

$$f''(x) = -\sec^2 x$$
$$-\sec^2 x = 0$$

This can never happen. Therefore the function never changes concavity. Therefore, since

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

the function is always concave down. It is never concave up.

(d) Where are the points of inflection?

There are no points of inflections since the function never changes concavity.