

Name: Key

## NO CALCULATORS

1. [5 points] What is the formal definition of the limit

$$\lim_{x \rightarrow a} f(x) = L?$$

~~Q~~  $\lim_{x \rightarrow a} f(x) = L$  if for every  $\epsilon > 0$ , there exists a  $\delta > 0$  such that if  $0 < |x - a| < \delta$  then  $|f(x) - L| < \epsilon$ .

2. [5 points] Using only the formal definition of limits prove that

$$\lim_{x \rightarrow 3} 2x + 1 = 7.$$

Let  $\epsilon > 0$ . Pick  $\delta = \epsilon/2$ . Suppose  $0 < |x - 3| < \epsilon/2$ .

Then  $|x - 3| < \epsilon/2$  implies

$2|x - 3| < \epsilon$  implies

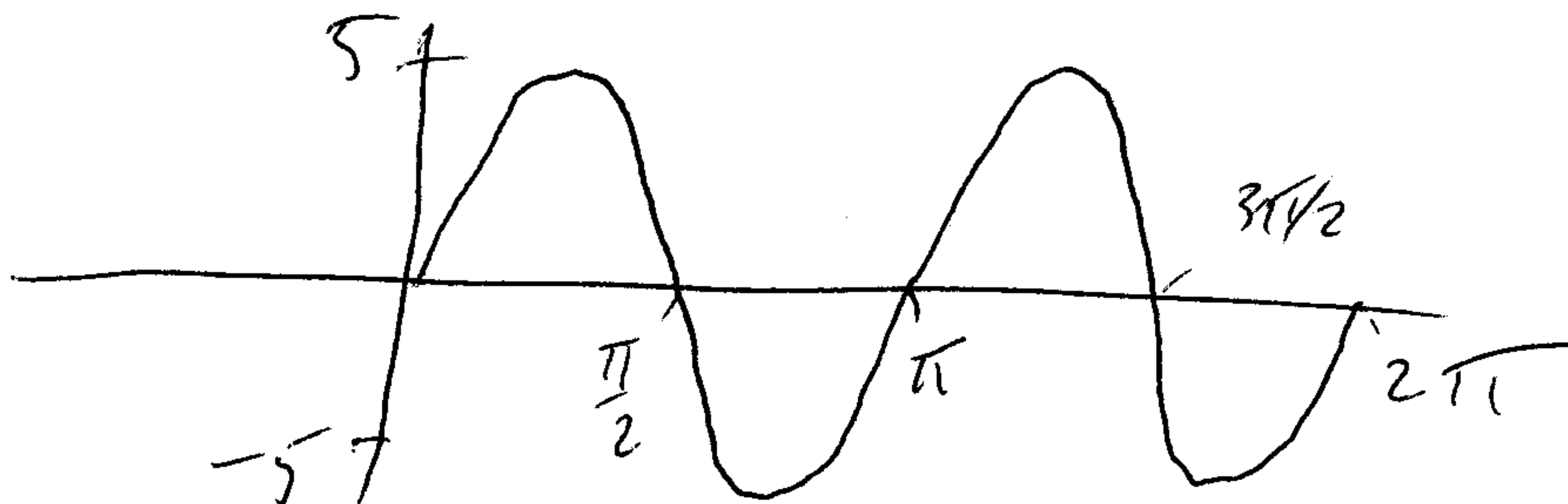
$|2x - 6| < \epsilon$  implies

$|2x + 1 - 7| < \epsilon$ .

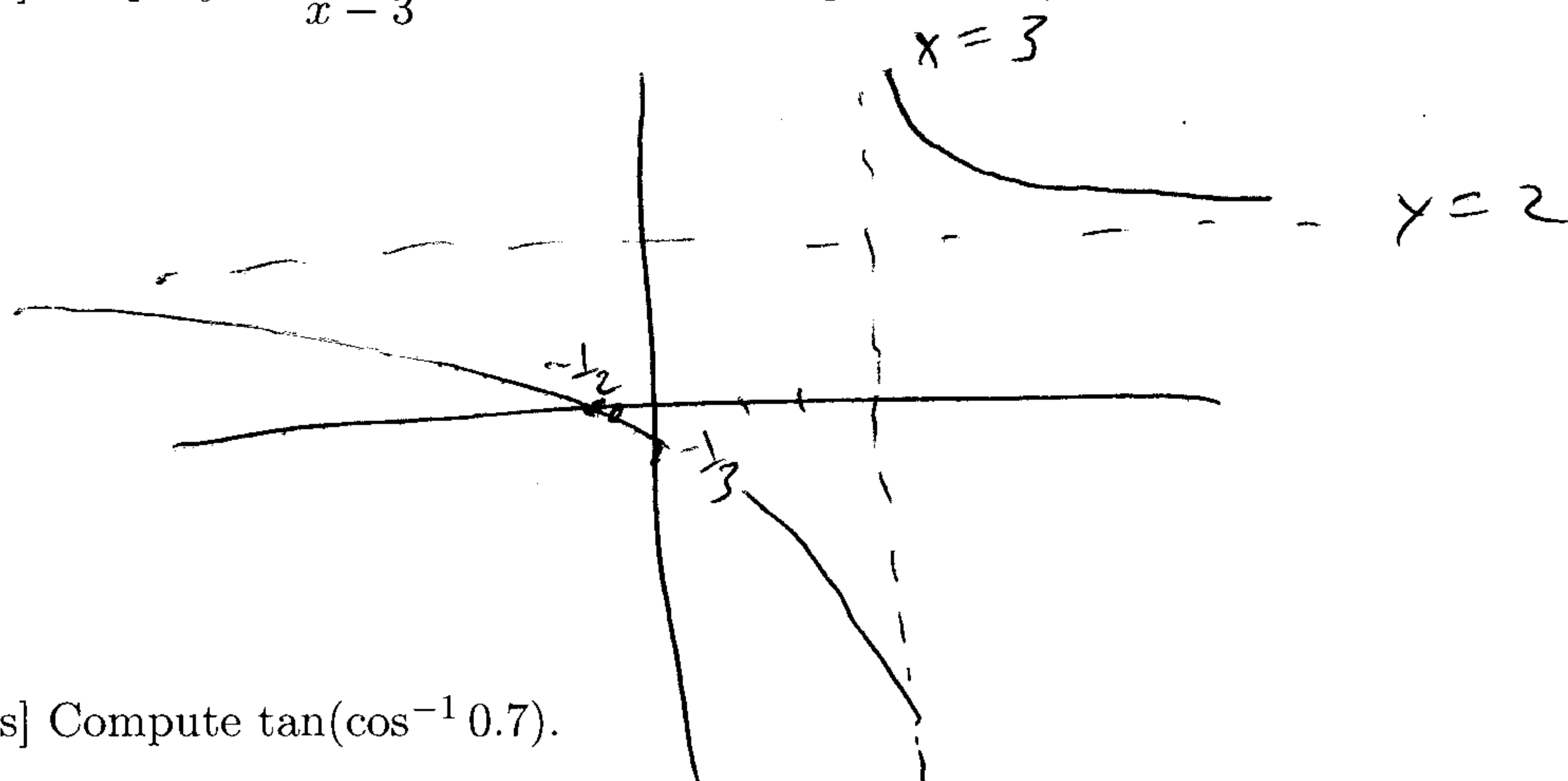
3. [5 points] What is the domain of  $f(x) = \sqrt{x^2 - 3}$ ?

~~$[-\sqrt{3}, \sqrt{3}]$~~ ,  $(-\infty, -\sqrt{3}] \cup [\sqrt{3}, \infty)$

4. [5 points] Graph two full cycles of  $y = 5 \sin 2x$ . Label the zeros.



5. [5 points] Graph  $y = \frac{2x+1}{x-3}$ . Label the intercepts and asymptotes.



6. [5 points] Compute  $\tan(\cos^{-1} 0.7)$ .

Let  $\theta = \cos^{-1} \frac{7}{10}$



$\tan \theta = \frac{\sqrt{51}}{7}$