

Name: Key**NO CALCULATORS**

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

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

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

$$\lim_{x \rightarrow 1} 3x + 2 = 5.$$

Let $\epsilon > 0$. Pick $\delta = \epsilon/3$. Suppose $0 < |x - 1| < \delta$.

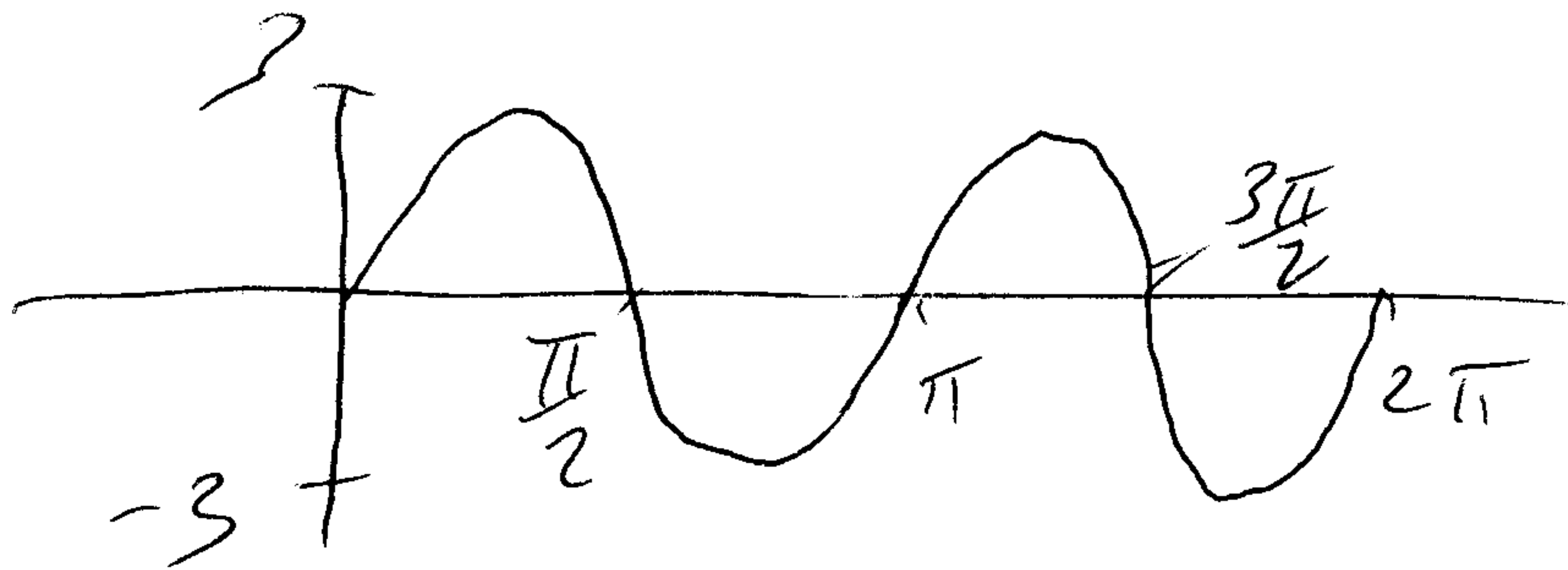
Then $|x - 1| < \epsilon/3$ implies

$3|x - 1| < \epsilon$ implies

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

$|3x + 2 - 5| < \epsilon$.

3. [5 points] Graph two full cycles of $y = 3 \sin 2x$. Label the zeros.

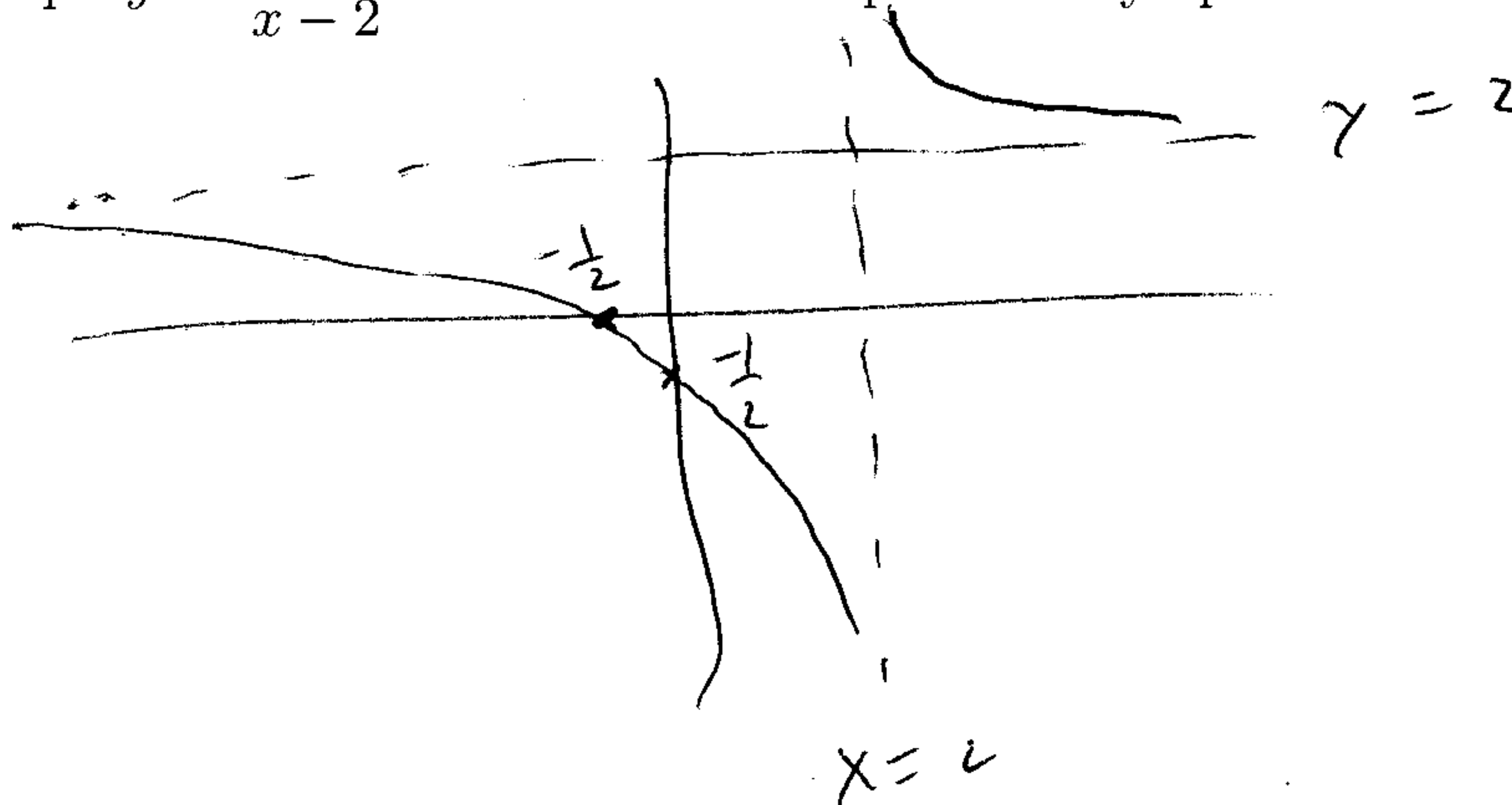


4. [5 points] What is the domain of $f(x) = \sqrt{x^2 - 3}$?

57567

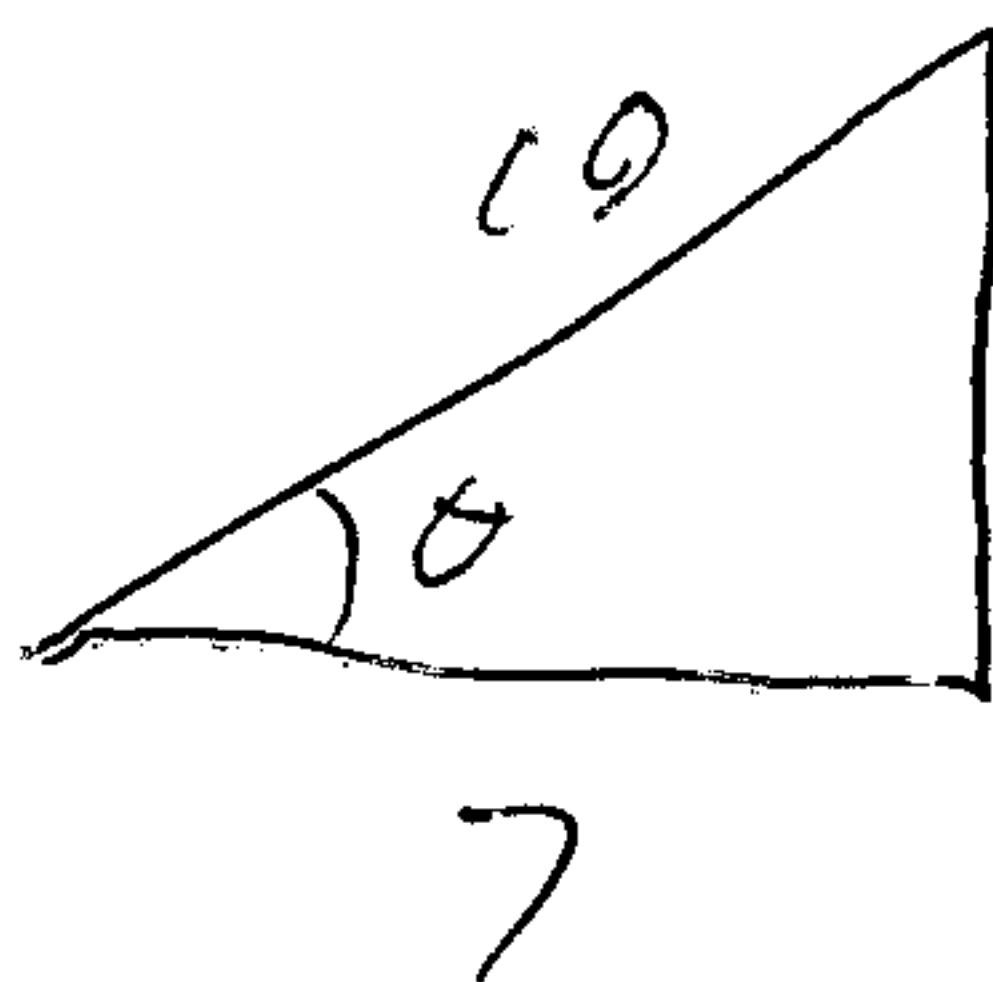
$$(-\infty, -\sqrt{3}] \cup [\sqrt{3}, \infty)$$

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



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

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



$$\sqrt{100 - 49} = \sqrt{51}$$

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