

Name: \_\_\_\_\_

ID: \_\_\_\_\_

Answer the following questions. Calculators are not allowed.

1. a) Solve the inequality:  $\frac{x-2}{x-1} \leq \frac{x+1}{x}$
- b) Find all values of  $\theta$  in  $[0, 2\pi)$  which satisfy:  
 $2 \cos^2 \theta - \cos \theta - 1 = 0$  [14 marks]

2. a) Identify and sketch the graph of  
 $x^2 + y^2 + 4x - 6y - 23 = 0$ .
- b) Find the equation of the straight line through the point  
 $(1, -5)$  and perpendicular to the line  $3y + x - 11 = 0$ .  
[14 marks]

3. a) Let  $f(x) = \sqrt{x^2 - 1}$  and  $g(x) = x - 2$ .  
Find  $(g \circ f)(x)$  and its domain.
- b) Find the limit (if it exists)  
 $\lim_{x \rightarrow 0} \frac{3|x|}{x + x^3}$ . [14 marks]

4. Find the horizontal and vertical asymptotes for the graph of

$$f(x) = \frac{2\sqrt{x^2 + 7}}{x + 5}$$

[8 marks]

Good Luck!