Answer the following questions. Each question counts 10 points.

Calculators are not allowed

1. (a)Solve the inequality: $\dfrac{x^2 - 3x - 4}{|x| - 1} \geq 0$.

   (b)Find the equation of the circle passing through the origin and its center is the point of the intersection of the two lines:

   $$x + y - 2 = 0 \quad \& \quad x - 2y = -4.$$

2. (a)Let $f(x) = \sqrt{x^2 - 16}$ and $g(x) = \sqrt{3 - x}$.

   Find $fog(x)$ and its domain.

   (b)Let $f(x) = \begin{cases} \dfrac{|x^2 - 4|}{x - 2} & if \quad x < 2 \\ x + 2 & if \quad x \geq 2 \end{cases}$

   Evaluate $\lim\limits_{x \to 2} f(x)$ (if exists).

3. (a)Use the definition of limit to prove that $\lim\limits_{x \to -2} (7x + 2) = -12$.

   (b)Evaluate:

   $$\lim\limits_{x \to 3} \left((x - 3)^2 \cos\left(\frac{1}{x - 3} \right) \right).$$

4. (a)Solve the following equation for $\theta \in [0, 2\pi)$:

   $$(2\cos\theta + 1)(\cos\theta - 3) = 0$$

   (b)Verify that : $\dfrac{\sec x - \cos x}{2\sin^2 x + \cos 2x} = \tan x \sin x.$

GOOD LUCK