Time: 60 minutes   26/11/02
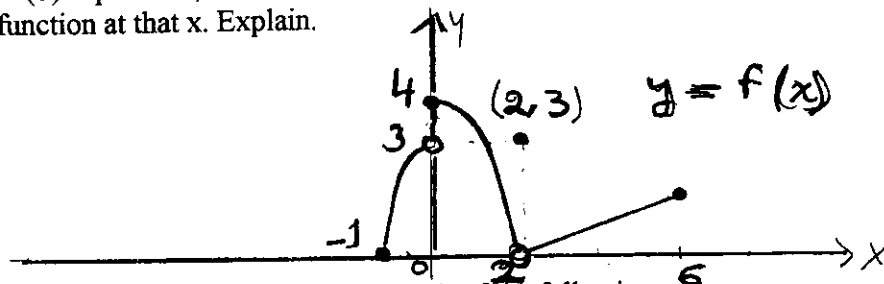
Instruction: Show your work in all the problems.

1. Given $f(x) = \sqrt{x}$, $g(x) = \sqrt{1-x}$. Find $g(f(x))$ and find its domain and range.

2. (a) Find the points of discontinuity for the function $f(x)$, whose graph is given below. For each such point, explain why the function is discontinuous there.

   (b) If possible, remove one discontinuity by assigning a different value for the function at that x. Explain.

3. Use reference triangles to find each of the following:

   (a) $\csc^{-1}(-2)$ (b) $\sec(\cot^{-1} 1)$ (c) $\tan(\sin^{-1}x)$, $x > 0$

4. $f(x) = \begin{cases} \dfrac{x}{|x|}, & x \neq 0 \\ \\ 0, & x = 0 \end{cases}$

   (a) Find $\lim\limits_{x \to 0^+} f(x)$ and $\lim\limits_{x \to 0^-} f(x)$. Does $\lim\limits_{x \to 0} f(x)$ exist? Explain.

   (b) Is $f(x)$ continuous at 0? Justify your answer.

5. Find $\lim\limits_{x \to 2} \dfrac{\sqrt{x+2} - 2}{x-2}$

6. Given $g(x) = \dfrac{2x-5}{x^2-4}$.

   (a) Find horizontal and vertical asymptotes of the graph of $g(x)$ from the function rule. <u>Do not draw the graph.</u>

   (b) Find $\lim\limits_{x \to 2^+} \dfrac{2x-5}{x^2-4}$ · Show your work.

7. Given the function $f(x) = -2x^2$. Find the slope m of the curve of $f(x)$ at $x = 3$. (Use the limit definition of m)