Solution:

For continuous

$\lim_{x\to 2}\ f(x) = f(2) = k$

$\Rightarrow\ k = \lim_{x\to 2}\ \frac{x^3+x^2-16x+20}{(x-2)^2}$

$= \lim_{x\to 2}\ \frac{(x^2-4x+4)\ (x+5)}{(x-2)^2}$

$= 7.$

Question 12:

$$f(x) = \{ \begin{matrix} \frac{x^2-4x+3}{x^2-1} & \text{for } x \neq 1 \\ 2 & \text{for } x = 1 \end{matrix}$$

, then find the condition for the function to be continuous or discontinuous.

Solution:

$f(x) = \left\{ \frac{x^2-4x+3}{x^2-1} \right\}$

,

for x = 1

f (1) = 2,

$f(1+) = \lim_{x\to 1+}\ \frac{x^2-4x+3}{x^2-1}$

$= \lim_{x\to 1+}\ \frac{(x-3)}{(x+1)}$

$= -1$

$f(1-) = \lim_{x\to 1-}\ \frac{x^2-4x+3}{x^2-1}$

$= -1$

$\Rightarrow\ f(1) \neq f(1-)$

Hence, the function is discontinuous at x = 1.

Question 13: Which of the following functions have a finite number of points of discontinuity in R ([.] represents the greatest integer function)?

A) tanx