

KING SAUD UNIVERSITY DEANSHIP OF THE FIRST YEAR COMMON BASIC SCIENCES DEPARTMENT

MATH 101 HW # 2

HW # 2 /SUMMER SEMESTER 1441

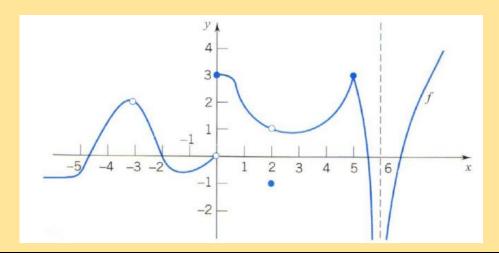
Date:25/06/2020

Question 1

1 Mark for each, except 6 (4 marks)

Use the graph below to answer the following (**if any**):

- 1. f(2)
- $2. \lim_{x \to 0} f(x)$
- 3. Find the domain of f.
- 4. Find the vertical asymptote(s) for f.
- 5. Find the horizontal asymptote(s) for f.
- 6. Find the x- values at which f is discontinuous.



Answer:

Use the definition of limit to show the following:

$$1.\lim_{x\to 2}(3x-2)=4.$$

$$2. \lim_{x \to 4^+} \sqrt{x - 4} = 0.$$

Answer:	

Question 3

3 Marks for each, except 3 (4 marks)

Find all horizontal and vertical asymptotes for the following functions (if any):

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

2.
$$g(x) = \frac{3x^3 + 7x^2 + 2}{-4x^3 + 5}$$
.

3.
$$h(x) = \begin{cases} \frac{4x}{x-4} & \text{if } x < 0\\ \frac{x^2}{x-2} & \text{if } 0 \le x < 2\\ \frac{\cos x}{x+1} & \text{if } x \ge 2 \end{cases}$$

Allswer:	

Question 4 3 Marks for each A. For which value of the constant c is function f continuous on $(-\infty, \infty)$ $f(x) = \begin{cases} cx^2 + 2x & \text{if } x < 2 \\ x^3 - cx & \text{if } x \ge 2 \end{cases}$ B. Use the intermediate value theorem to show that there is some u with $0 \le u \le 2$ s.t $u^2 + \cos \pi u = 4$. Answer:	
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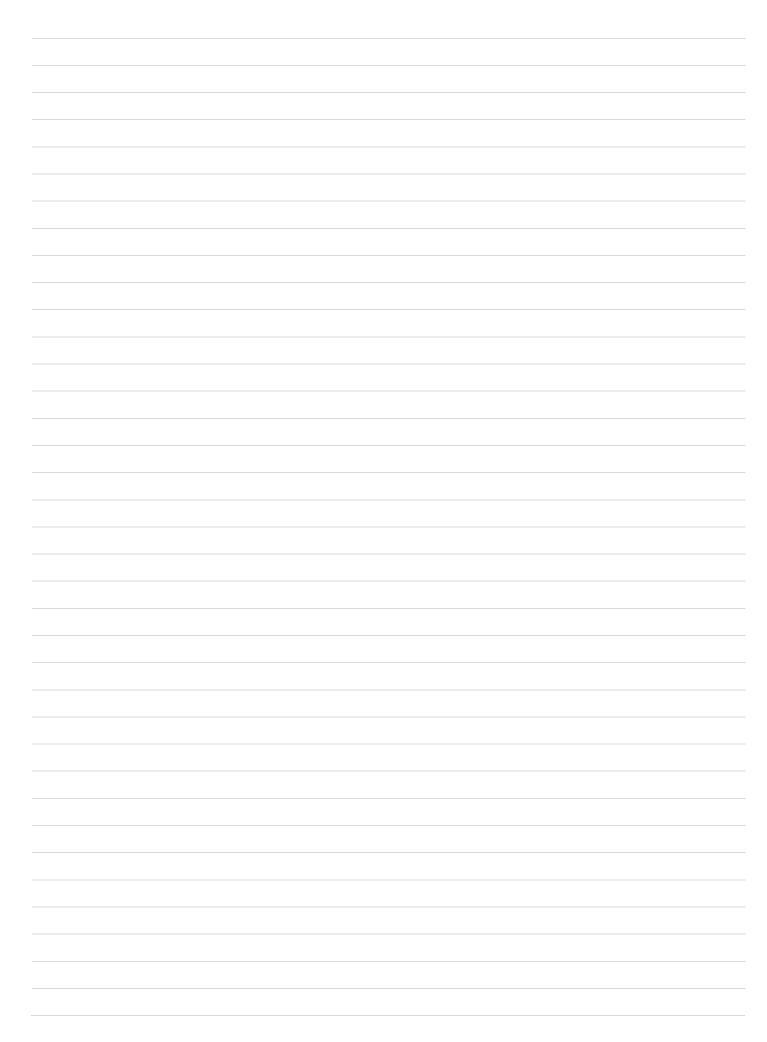
Question 5	2 Marks for each, except 2and 6 (3 marks)
Find the following limits (if exist):	
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$1.\lim_{x \to 1} \frac{\sqrt{x+1-1}}{x}$.	$2.\lim x^4 \sin \frac{\pi}{x}$.
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Question 6

2 Marks for each, except B (4 marks)

- **A.** By using the definition of derivative $f'(x) = \lim_{h \to 0} \frac{f(x+h) f(x)}{h}$ find:
 - 1. f'(x) if $f(x) = x^2 2x$.
 - 2. The slope of the tangent line to the graph of f at x = 2.
 - 3. The equation of the tangent line to the graph of f at the point (2,0).
- **B.** Show whether or not the function $g(x) = \begin{cases} \sqrt{x} 3 & \text{if } x > 1 \\ \frac{1}{2}x \frac{5}{2} & \text{if } x \le 1 \end{cases}$ is differentiable at x = 1.

answer:	



Question 7 2 Marks for each, except B (3 marks)
A. Use the differentiation rules to find the derivative of the following functions:
1. $f(x) = 10\sqrt[5]{x^3} - \sqrt{x^7} - 4$.
2. $h(x) = \frac{(1-3x)(2x+1)}{(3x-2)}$.
(3x-2)
B. find x-coordinates of points where the tangent line to the graph of the given function is
horizontal:
$g(x) = (x+2)(x^2-2x-8)$.
Answer: