



King Abdulaziz University  
Faculty of Science  
Department of Mathematics



**First Semester: 1445 (2023 – 2024)**  
**Second Exam Math 110**

**Model: D**

**Total degree: 30**

**Date: Monday 29 / 4 / 1445 ( 13 / 11 / 2023 )**

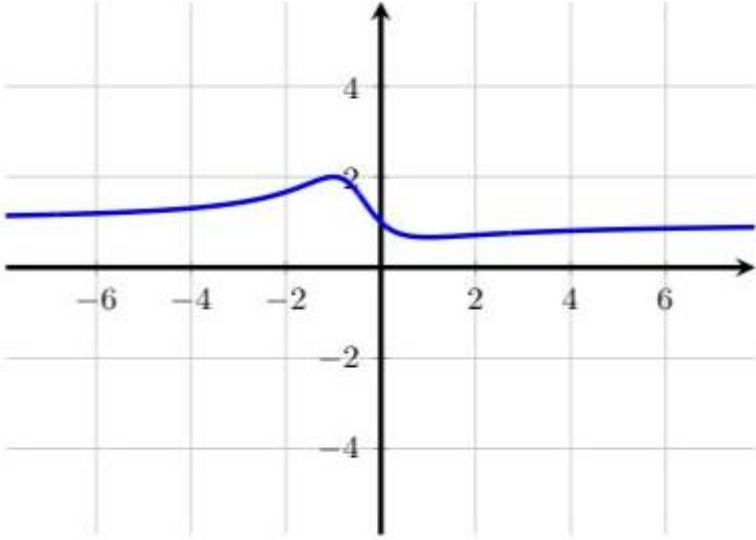
**Time: 9:00 - 10:30 AM**

**General Instructions:**

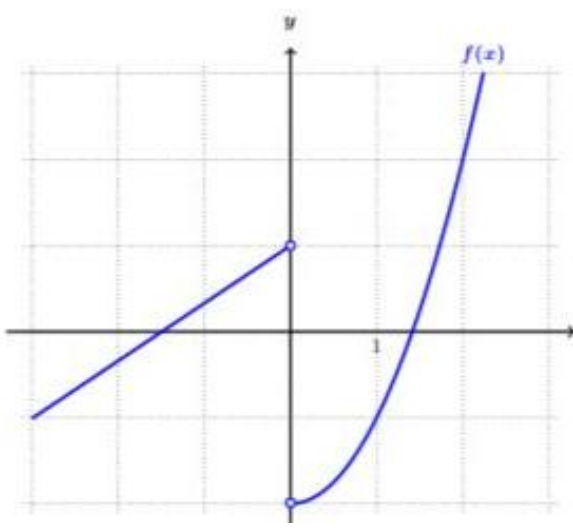
- Write your full name and university ID in the paper below.
- Read every question carefully.
- Make sure you have 30 questions.
- Each question is assigned one point.
- The time limit of the exam is 90 minutes.
- Completely circle the correct answer in your answer sheet form.
- Use only **PENCIL**.
- Please obey the rules provided by invigilators.
- The telephone and calculator are not allowed during the exam.
- The exam is closed book; no form of external aid is allowed during the exam.
- Mere suspicion of cheating will be enough to get your test withdrawn.
- Good luck on your exam.

**Name:** .....

**ID Number:** .....

Q1	<p>The vertical asymptote(s) of the function <math>f(x) = \frac{x^2}{3x-2x^2}</math> is (are)</p> <p>(a) <math>x = \frac{3}{2}</math> *      (b) <math>x = 0</math>      (c) <math>x = 0, x = \frac{3}{2}</math>      (d) <math>x = -\frac{2}{3}</math></p>
Q2	<p>The horizontal asymptote of the following graph of the function is</p>  <p>(a) <math>x = -1</math>      (b) <math>y = 1</math>      (c) <math>x = 1</math> *      (d) <math>y = -1</math></p>
Q3	<p>The function <math>f(x) = \sqrt{6-x}</math> is continuous on</p> <p>(a) <math>\mathbb{R} - \{6\}</math>      (b) <math>\mathbb{R}</math>      (c) <math>(6, \infty)</math>      (d) <math>(-\infty, 6]</math> *</p>
Q4	<p>The function <math>f(x) = \frac{x^2+2x-8}{x-2}</math> is continuous on <math>\mathbb{R} - \{2\}</math></p> <p>(a) True *      (b) False</p>
Q5	<p><math>\lim_{x \rightarrow 1} \frac{1}{(x-1)^2} =</math></p> <p>(a) 2      (b) <math>\infty</math> *      (c) <math>-\infty</math>      (d) 0</p>

Q6	<p>The function <math>f(x) = \begin{cases} x^3 - cx &amp; \text{if } x \geq 2 \\ cx^2 + 2x &amp; \text{if } x &lt; 2 \end{cases}</math> is continuous on <math>(-\infty, \infty)</math> then the value of the constant <math>c</math> is</p> <p>(a) <math>\frac{3}{2}</math>                      (b) <math>-\frac{3}{2}</math>                      (c) <math>\frac{2}{3}</math> *                      (d) <math>-\frac{2}{3}</math></p>
Q7	<p>Suppose <math>f</math> and <math>g</math> are continuous functions such that <math>g(3) = 4</math>, <math>\lim_{x \rightarrow 3} [f(x)g(x) + 2f(x)] = 12</math>, then <math>f(3) =</math></p> <p>(a) <math>-3</math>                      (b) <math>2</math> *                      (c) <math>4</math>                      (d) <math>0</math></p>
Q8	<p>Let <math>\lim_{x \rightarrow 1} f(x)</math> exists, where <math>f(x) = \begin{cases} k - x^2 &amp; \text{if } x \leq 1 \\ 2x + 2k &amp; \text{if } x &gt; 1 \end{cases}</math>, then the value of <math>k</math> is</p> <p>(a) <math>3</math>                      (b) <math>1</math>                      (c) <math>-3</math> *                      (d) <math>-1</math></p>
Q9	<p>If <math>g(x)</math> is continuous from the right at <math>4</math> such that <math>\lim_{x \rightarrow 4^+} g(x) = -1</math>, then <math>g(4) =</math></p> <p>(a) <math>4</math>                      (b) <math>\infty</math>                      (c) <math>1</math>                      (d) <math>-1</math> *</p>
Q10	<p>If the function <math>f(x) = \begin{cases} 5 - 6x &amp; \text{if } x \leq -1 \\ x^2 + 2x &amp; \text{if } x &gt; -1 \end{cases}</math>. Then <math>f(x)</math> is</p> <p>(a) continuous from the right at <math>x = -1</math>  (b) continuous at <math>x = -1</math>  (c) continuous from the left at <math>x = -1</math> *  (d) discontinuous from the left at <math>x = -1</math></p>

Q11	<p>If <math>\lim_{x \rightarrow 5} f(x) = 0</math> and <math>\lim_{x \rightarrow 5} g(x) = 0</math>, then <math>\lim_{x \rightarrow 5} \left[ \frac{f(x)}{g(x)} \right]</math> does not exist</p> <p>(a) True (b) False *</p>
Q12	<p>If <math>\lim_{x \rightarrow -2} \frac{8-f(x)}{x+2} = 20</math>, then <math>\lim_{x \rightarrow -2} f(x) =</math></p> <p>(a) 4 (b) 20 (c) -2 (d) 8 *</p>
Q13	<p>If <math>f(x) = \begin{cases} 2x^2 + 3, &amp; \text{if } x \geq -1 \\ -x + 5, &amp; \text{if } x &lt; -1 \end{cases}</math>. Then <math>\lim_{x \rightarrow -1^-} f(x) =</math></p> <p>(a) doesn't exist (b) 5 (c) 6 * (d) -1</p>
Q14	<p>If <math>5x \leq f(x) \leq 3x^4 + 2x^2</math> for all <math>x</math>, then <math>\lim_{x \rightarrow 1} f(x) =</math></p> <p>(a) 5 * (b) -3 (c) doesn't exist (d) 0</p>
Q15	<p>As shown in the graph below, <math>\lim_{x \rightarrow 0^-} f(x) =</math></p> <div style="text-align: center;">  </div> <p>(a) 1 * (b) -2 (c) 0 (d) <math>\infty</math></p>

Q16	Any trigonometric functions are continuous at every number in their ranges (a) True (b) False *
Q17	$\lim_{x \rightarrow -\infty} e^x = -\infty$ (a) True (b) False *
Q18	$\lim_{x \rightarrow 9} \frac{3 - \sqrt{x}}{9x - x^2} =$ (a) $-\frac{1}{3}$ (b) 9 (c) $-\frac{1}{54}$ (d) $\frac{1}{54}$ *
Q19	$\lim_{x \rightarrow \infty} \frac{1 - 4x^2 - x^3}{2x^3 + x + 5} =$ (a) $-\frac{4}{5}$ (b) 1 (c) $-\frac{1}{2}$ * (d) $\infty$
Q20	$\lim_{x \rightarrow \infty} \frac{1}{x^8} = 0$ (a) True * (b) False
Q21	$\lim_{x \rightarrow \infty} \frac{x^3 - x}{x^2 - 6x + 5} =$ (a) $\infty$ * (b) $-\infty$ (c) $-1$ (d) $-6$
Q22	$\lim_{x \rightarrow -\infty} \frac{\sqrt{1 + 4x^6}}{2 - x^3} =$ (a) $-2$ (b) $-\sqrt{2}$ (c) $2$ * (d) $\sqrt{2}$
Q23	$\lim_{x \rightarrow \infty} (\sqrt{x^2 + 10} - x) = -\infty$ (a) True (b) False *

Q24	$\lim_{x \rightarrow -\infty} \frac{5x^2 - x + 1}{x^3 - 3x^2 - x} =$ (a) $-\frac{5}{3}$ (b) $-\infty$ (c) $\infty$ (d) $0^*$
Q25	$\lim_{x \rightarrow 8} \frac{ x-8 }{x-8}$ does not exist (a) True *                      (b) False
Q26	$\lim_{x \rightarrow -4} \frac{16 - x^2}{x - 4} =$ (a) 8                      (b) $-4$ (c) $0^*$ (d) $-\infty$
Q27	The function $f(x) = \cos^{-1}(x + 3)$ is continuous on $[-4, -2]$ (a) True *                      (b) False
Q28	$\lim_{x \rightarrow -1} \left( \frac{5x^2 + 4}{2x^5 - x^4} \right)^2 =$ (a) $-3$ (b) $9^*$ (c) $\frac{1}{9}$ (d) $-9$
Q29	$\lim_{x \rightarrow 0} \frac{x^3 - x}{6x} =$ (a) $\infty$ (b) 0                      (c) 6                      (d) $-\frac{1}{6}^*$
Q30	$\lim_{x \rightarrow 2^+} \ln(x - 2) =$ (a) $\infty$ (b) 2                      (c) $-\infty^*$ (d) 0

With our best wishes