King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 101
Major Exam I
233
July 10, 2024
Net Time Allowed: 90 Minutes

MASTER VERSION

Question 46 (Page 247) Section 4.5

1. If $y = k$ is a horizontal asymptote for the function $f(x) = \dfrac{\sqrt{9x^2 - 2}}{2x + 1}$, then the product of all possible values of k is

(a) $\dfrac{-9}{4}$ (correct)

(b) $\dfrac{-3}{4}$

(c) $\dfrac{-9}{2}$

(d) $\dfrac{3}{4}$

(e) $\dfrac{9}{2}$

Question 48 (Page 247) Section 4.5

2. $\lim\limits_{x \to \infty} x \tan \dfrac{1}{x}$

(a) equals 1 (correct)

(b) equals 0

(c) equals π

(d) does not exist

(e) equals -1

Question 42 (Page 150) Section 3.3

3. If $f(x) = (x^3 - x)(x^2 + 2)(x^2 + x - 1)$, then $f'(1) =$

(a) 6 _____ (correct)

(b) 8

(c) 4

(d) 2

(e) 10

Question 81 (Page 151) Section 3.3

4. If the function $f(x) = \dfrac{8(x-2)}{e^x}$ has a horizontal tangent line at $x = a$, then $a =$

(a) 3 _____ (correct)

(b) 4

(c) 2

(d) 5

(e) 1

Question 46 (Page 250 - Review Chapter 3) Section 3.3

5. If $y = ax + b$ is the equation of the tangent line to the graph of the function $f(x) = \dfrac{1+\cos x}{1-\cos x}$ at the point $\left(\dfrac{\pi}{2}, 1\right)$, then $a + b =$

(a) $\pi - 1$ (correct)

(b) $\pi + 1$

(c) π

(d) $\pi - 2$

(e) $\pi + 2$

Question 56 (Page 139) Section 3.2

6. If $y = \dfrac{3}{(2x)^3} + 2\sin x$, then $\dfrac{dy}{dx}$ at $x = \dfrac{\pi}{2}$ is equal to

(a) $\dfrac{-18}{\pi^4}$ (correct)

(b) $\dfrac{18}{\pi^4}$

(c) $\dfrac{-9}{\pi^4}$

(d) $\dfrac{9}{\pi^4}$

(e) $\dfrac{1}{\pi^4}$

Question 54 (Page 128) Section 3.1

7. If the tangent line to the graph of $y = h(x)$ at the point $(-1, 4)$ passes through the point $(3, 6)$, then $h(-1) + 2h'(-1) =$

(a) 5 (correct)

(b) 6

(c) 7

(d) 4

(e) 3

Question 48 (Page 139) Section 3.2

8. If $h(x) = \dfrac{x^3 + 2x + 6}{x^{\frac{1}{3}}}$, then $h'(1) =$

(a) 4 (correct)

(b) 3

(c) 2

(d) 5

(e) 6

Question 21 (Page 112) Section 2.5

9. The number of vertical asymptotes of the graph of the function $f(x) = \dfrac{4x^2 + 4x - 24}{x^4 - 2x^3 - 9x^2 + 18x}$ is

(a) 2 _____(correct)

(b) 3

(c) 4

(d) 1

(e) 0

True or False Questions (Page 114) Section 2.5

10. Which one of the following statements is **False**?

(a) The graph of every rational function has a vertical asymptote _____(correct)

(b) The graphs of polynomial functions have no vertical asymptotes

(c) The graphs of trigonometric functions may have vertical asysmptotes

(d) The graph of a function cannot cross a vertical asymptote

(e) The graph of a rational function may have several vertical asymptotes

Question 64 (Page 104) Section 2.4

11. If the function $g(x) = \begin{cases} \dfrac{4\sin x}{x}, & x < 0 \\ a - 2x, & x \geq 0 \end{cases}$ is continuous at $x = 0$, then $a =$

(a) 4 _____ (correct)

(b) 2

(c) -2

(d) -4

(e) 0

Question 27 (Page 103) Section 2.4

12. $\lim_{x \to -1} \left([\![\frac{x}{3}]\!] + 3 \right)$

(a) equals 2 _____ (correct)

(b) does not exist

(c) equals 3

(d) equals 0

(e) equals -2

Question 78 (Page 92) Section 2.3

13. $\lim_{x\to 16} \dfrac{4-\sqrt{x}}{x-16} =$

(a) $\dfrac{-1}{8}$ _____(correct)

(b) $\dfrac{-1}{4}$

(c) $\dfrac{1}{8}$

(d) $\dfrac{1}{4}$

(e) $\dfrac{1}{2}$

Question 43 (Page 91) Section 2.3

14. $\lim_{x\to 2} \dfrac{x^3-8}{x-2} =$

(a) 12 _____(correct)

(b) 14

(c) 10

(d) 16

(e) 8