King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 106
Major Exam I
232
February 28, 2024
Net Time Allowed: 120 Minutes

USE THIS AS A TEMPLATE

Write your questions, once you are satisfied upload this file.

1. The value of $\lim\limits_{z \to 0} \dfrac{z^2 - 5z - 4}{z^2 + 1}$ is Q18/10.1

   (a) -4
   (b) -5
   (c) does not exist
   (d) 0
   (e) $-\infty$

2. The value of $\lim\limits_{x \to \infty} \dfrac{6 - 4x^2 + x^3}{4 + 5x - 7x^2}$ is Q35/10.2

   (a) $-\infty$
   (b) -7
   (c) 4
   (d) 6
   (e) -4

3. The value of $\lim\limits_{x \to 3} \dfrac{x^2 - x - 6}{x - 3}$ is Q25/10.1

    (a) 5

    (b) -3

    (c) ∞

    (d) $-\infty$

    (e) -6

4. If $y = \sqrt[3]{(4x^2 + 3x + 7)^2}$, then $\dfrac{dy}{dx}$ when $x = -1$ similar to Example 4 /11.5

    (a) $-\dfrac{5}{3}$

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

    (c) $-\dfrac{1}{5}$

    (d) 1

    (e) -2

5. The points of discontinuity of

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

are Q24/10.3

   (a) $x = 0$ and $x = -1$

   (b) $x = 0$ and $x = 3$

   (c) $x = -3$ and $x = -1$

   (d) $x = -3$ and $x = 1$

   (e) $x = 1$ and $x = 3$

6. The number of points of discontinuity of the function

$$f(x) = \begin{cases} 3x + 5 & x \geq -2 \\ 2 & x < -2 \end{cases}$$

is Q30/10.3

   (a) 1

   (b) 0

   (c) 2

   (d) 3

   (e) 4

7. An equation of the tangent line to the curve $y = 3x^2 - 4$ at the point $(1, -1)$ is Q24/11.1

    (a) $y - 6x + 7 = 0$

    (b) $y - 2x + 3 = 0$

    (c) $y - 5x + 4 = 0$

    (d) $y + 5x - 3 = 0$

    (e) $y - 4x + 3 = 0$

8. The slope of the tangent line to the curve $y = \dfrac{8 \sqrt{x} \, (2 - x^2)}{x}$ at the point $(4, -2)$ is similar to Q84/11.2

    (a) -25

    (b) 8

    (c) -8

    (d) -17

    (e) 23

9. If the position function of an object moving along a number line is given by $s = f(t) = 10\ t + \ln(t^2 - 4t + 4)$, where t is in seconds and s is in meters, then the average velocity over the interval $[1, 3]$ equals similar to Q3-8/11.3

  (a) 10
  (b) 4
  (c) 5
  (d) 20
  (e) e

10. If a manufacturer's cost equation is $\quad c = 0.1q^2 + 3q + 2 \quad$ where c is the cost of producing q units of a product. Find the marginal-cost when 5 units are produced. Q6/11.3

  (a) 4
  (b) 3
  (c) 2
  (d) 1
  (e) 6

11. If $y = (3x + 5)(x - 2)(x + 7)$, then $\dfrac{dy}{dx}$ is similar to Q19/11.4

    (a) $9x^2 + 40x - 17$

    (b) $3x^2 + 20x + 29$

    (c) $7x^2 - 3x + 2$

    (d) $5x^2 - 2x + 3$

    (e) $3x^2 - 12x + 15$

12. If the demand equation for a manufacturer's product is $p = -0.1q + 500$ where p is in dollars, then the marginal-revenue function is Q49/Ch11 Review Problems

    (a) $500 - 0.2q$

    (b) $500q$

    (c) -0.1

    (d) $-0.500q$

    (e) 1

13. If $z = u^2 + \sqrt{u} + 9$ and $u = 2s^2 - 1$, then dz/ds when $s = -1$. Q6/11.5

   (a) -10
   (b) 9
   (c) 2
   (d) -1
   (e) -8

14. If $f(x) = \ln\left[(5x + 15)^4 (3x + 3)^6\right]$, then $f'(1) =$ similar to Q32/12.1

   (a) 4
   (b) 3
   (c) 2
   (d) 1
   (e) 5

15. The equation of the tangent line to the curve $y = \ln(x^2 - 3x + 1)$ at the point where $x = 3$ is similar to Q45/12.1

    (a) $y = 3x - 9$
    (b) $y = -3x + 1$
    (c) $y = -x - e$
    (d) $y = 2x + e$
    (e) $y = x + e$

16. The slope of the tangent line to the curve of $y = (e^{2x} + 1)^3$ at $x = 0$ is similar to Q20/12.2

    (a) 24
    (b) 18
    (c) 32
    (d) 3
    (e) 2

17. Let $f(x) = 2^x \, x^2$ then $f'(2)$ is Q16/12.2

    (a) $16 + 16 \ln 2$

    (b) 8

    (c) $32 + \ln 2$

    (d) 32

    (e) 64

18. If $x\sqrt{y+1} = y\sqrt{x+1}$, find $\dfrac{dy}{dx}$ at $(0,0)$ Q26/12.4

    (a) 1

    (b) 2

    (c) $\sqrt{2}$

    (d) $\dfrac{\sqrt{2}}{2}$

    (e) $-\sqrt{2}$

19. If $2p\, q^2 - p^3 = q^2 - \ln p$, find $\dfrac{dq}{dp}$ at $(1,1)$ (assume that q is a function of p) similar to Example4/12.4

    (a) 0
    (b) 1
    (c) 2
    (d) $\ln 2$
    (e) $\ln \frac{1}{2}$

20. The slope of the tangent line to the curve of $x^3 = (y - x^2)^2$ at the point $(1,0)$ is equal to similar Example3/12.4

    (a) $\frac{1}{2}$
    (b) 1
    (c) -1
    (d) 3
    (e) 2