BRITISH COLUMBIA CALCULUS 12 (MCALC12) · FINAL EXAM · 50 QUESTIONS

Final Exam — Practice Test

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

1 The range of $f(x) = x^2 + 4$ is

- A $y \le 4$
- B all real numbers
- C $y \ge 4$
- D $y > 4$

Understand It with Pulse | Flag a mistake

2 $\frac{d}{dx} x^7$ is

- A $7x^6$
- B $7x^7$
- C x^6
- D $6x^7$

Understand It with Pulse | Flag a mistake

3 **The function $f(x) = x^2 - 4x + 3$ is increasing on**

A $x < 2$

B $x > 2$

C $x < -2$

D $x > -2$

Understand It with Pulse | Flag a mistake

4 **$\int (2x + 3)\,dx$ is**

A $x^2 + 3x + C$

B $2x^2 + 3x + C$

C $x^2 + 3 + C$

D $x^2 - 3x + C$

Understand It with Pulse | Flag a mistake

5 The function $f(x) = \frac{x^2 - 9}{x - 3}$ for $x \neq 3$ and $f(3) = a$ is continuous at $x = 3$ when a equals

- **A** 3
- **B** 0
- **C** 9
- **D** 6

Understand It with Pulse | Flag a mistake

6 $\frac{d}{dx}[x^2(3x + 1)]$ is

- **A** $9x^2 + 2x$
- **B** $6x^2 + 2x$
- **C** $9x^2 + 1$
- **D** $3x^2 + 2x$

Understand It with Pulse | Flag a mistake

7 **The function $f(x) = x^3$ is concave up on**

- A $x < 0$
- B $x > 0$
- C all x
- D never

Understand It with Pulse | Flag a mistake

8 **$\int_0^2 x\,dx$ is**

- A 1
- B 2
- C 4
- D 0

Understand It with Pulse | Flag a mistake

9 The inverse of $f(x) = 4x + 3$ is

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

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

C $f^{-1}(x) = 4x - 3$

D $f^{-1}(x) = \frac{x - 3}{4}$

Understand It with Pulse | Flag a mistake

10 If $f(x) = \frac{x^2 + 1}{x - 1}$, then $f'(2)$ is

A 1

B -1

C 3

D -3

Understand It with Pulse | Flag a mistake

11 The function $f(x) = -x^2 + 6x$ is decreasing on

- **A** $x < 3$
- **B** $x > 6$
- **C** $x < 6$
- **D** $x > 3$

Understand It with Pulse | Flag a mistake

12 $\int_{-1}^{1} x^2\,dx$ is

- **A** $\frac{1}{3}$
- **B** 0
- **C** $\frac{2}{3}$
- **D** 2

Understand It with Pulse | Flag a mistake

13 $\lim_{x \to \infty} \frac{4x - 1}{x^2 + 3}$ is

A 4

B 1

C ∞

D 0

Understand It with Pulse | Flag a mistake

14 If $f(x) = (x^2 + 1)^3$, then $f'(1)$ is

A 12

B 6

C 24

D 18

Understand It with Pulse | Flag a mistake

15 A cone has radius half its height and its height grows at 2 cm/s. When h = 6 cm, $\frac{dV}{dt}$ is

- **A** 9π cm³/s
- **B** 36π cm³/s
- **C** 6π cm³/s
- **D** 18π cm³/s

Understand It with Pulse | Flag a mistake

16 If F'(x) = f(x), F(2) = 5, and F(5) = 11, then $\int_2^5 f(x)\,dx$ is

- **A** 16
- **B** 6
- **C** -6
- **D** 55

Understand It with Pulse | Flag a mistake

17 The vertical asymptote of $f(x) = \frac{x + 1}{x - 2}$ is

- **A** $x = -1$
- **B** $x = 1$
- **C** $x = -2$
- **D** $x = 2$

Understand It with Pulse | Flag a mistake

18 If $f(x) = \sin x$, then $f'(\frac{\pi}{3})$ is

- **A** $\frac{\sqrt{3}}{2}$
- **B** $\frac{1}{2}$
- **C** $-\frac{1}{2}$
- **D** $\frac{1}{\sqrt{3}}$

Understand It with Pulse | Flag a mistake

19 The profit function is $P(x) = -2x^2 + 40x - 50$. The maximum profit is

- A 100
- B 200
- C 50
- D 150

Understand It with Pulse | Flag a mistake

20 The area between $y = 4 - x^2$ and the x-axis is

- A $\frac{16}{3}$
- B 16
- C $\frac{8}{3}$
- D $\frac{32}{3}$

Understand It with Pulse | Flag a mistake

21 $\lim_{x \to 3^-} \frac{|x - 3|}{x - 3}$ is

A 1

B 0

C -1

D does not exist

Understand It with Pulse | Flag a mistake

22 $\frac{d}{dx} \ln 5x$ is

A $\frac{5}{x}$

B $\frac{1}{5x}$

C $\frac{1}{x}$

D 5

Understand It with Pulse | Flag a mistake

23 **With 120 m of fencing and one side along a wall, the greatest possible area is**

- A 1200 m²
- B 1800 m²
- C 2400 m²
- D 900 m²

Understand It with Pulse | Flag a mistake

24 **The volume formed by rotating y = 3, 0 ≤ x ≤ 2, about the x-axis is**

- A 9π
- B 6π
- C 18π
- D 36π

Understand It with Pulse | Flag a mistake

25 As $x \to \infty$, the value of $-x^4 + 3x$ approaches

- A ∞
- B 0
- C $-\infty$
- D 3

Understand It with Pulse | Flag a mistake

26 If $f(x) = x^4 - 3x^2$, then $f''(x)$ is

- A $12x^2 - 6$
- B $4x^3 - 6x$
- C $12x^2 + 6$
- D $12x^3 - 6x$

Understand It with Pulse | Flag a mistake

27 A ball has height $h(t) = -5t^2 + 20t$ metres. Its maximum height is

- **A** 10 m
- **B** 40 m
- **C** 20 m
- **D** 15 m

Understand It with Pulse | Flag a mistake

28 $\int_0^1 (x + 1)^2 \, dx$ is

- **A** $\frac{7}{3}$
- **B** $\frac{8}{3}$
- **C** 3
- **D** $\frac{5}{3}$

Understand It with Pulse | Flag a mistake

29 $\lim_{x \to \infty} \frac{\sqrt{4x^2 + 1}}{x}$ is

A 4

B 1

C 2

D 0

Understand It with Pulse | Flag a mistake

30 The equation of the tangent to $f(x) = x^3$ at $x = 2$ is

A $y = 12x - 16$

B $y = 12x + 8$

C $y = 6x - 4$

D $y = 12x - 8$

Understand It with Pulse | Flag a mistake

31 **The function $f(x) = -x^3 + 2x^2$ is concave down on**

- **A** $x < 0$
- **B** $x > 0$
- **C** $x < 2$
- **D** $x > \frac{2}{3}$

Understand It with Pulse | Flag a mistake

32 **$\int 4x^3\,dx$ is**

- **A** $x^4 + C$
- **B** $4x^4 + C$
- **C** $12x^2 + C$
- **D** $x^3 + C$

Understand It with Pulse | Flag a mistake

33 The range of $f(x) = \sqrt{x} + 3$ is

A $y \geq 0$

B $y > 3$

C $y \geq 3$

D $y \leq 3$

Understand It with Pulse | Flag a mistake

34 $\frac{d}{dx}\sqrt{x}$ is

A $\frac{1}{\sqrt{x}}$

B $\frac{1}{2\sqrt{x}}$

C $2\sqrt{x}$

D $-\frac{1}{2\sqrt{x}}$

Understand It with Pulse | Flag a mistake

35 The inflection points of $f(x) = x^4 - 6x^2$ occur at

- A $x = 0$
- B $x = \pm 1$
- C $x = \pm 2$
- D $x = \pm 3$

Understand It with Pulse | Flag a mistake

36 $\int_0^3 x^2\,dx$ is

- A 27
- B 9
- C 3
- D 18

Understand It with Pulse | Flag a mistake

37 The function $f(x) = x^4 + 3x^2$ is

- **A** odd
- **B** neither even nor odd
- **C** even
- **D** both even and odd

Understand It with Pulse | Flag a mistake

38 $\frac{d}{dx}\frac{2x - 1}{x + 2}$ is

- **A** $\frac{5}{(x + 2)^2}$
- **B** $\frac{3}{(x + 2)^2}$
- **C** $\frac{-5}{(x + 2)^2}$
- **D** $\frac{2}{(x + 2)^2}$

Understand It with Pulse | Flag a mistake

39 A cube has side s growing at 0.2 cm/s . When s = 5 cm, $\frac{dV}{dt}$ is

- **A** 15 cm^3/s
- **B** 25 cm^3/s
- **C** 5 cm^3/s
- **D** 75 cm^3/s

Understand It with Pulse | Flag a mistake

40 $\frac{d}{dx} \int_0^{3x} t\, dt$ is

- **A** 3x
- **B** 9x
- **C** 6x
- **D** $\frac{9x^2}{2}$

Understand It with Pulse | Flag a mistake

41 $\lim_{x \to 9} \frac{\sqrt{x} - 3}{x - 9}$ is

A $\frac{1}{3}$

B $\frac{1}{9}$

C 3

D $\frac{1}{6}$

Understand It with Pulse | Flag a mistake

42 $\frac{d}{dx} \tan x$ is

A $\sec^2 x$

B $\csc^2 x$

C $-\sec^2 x$

D $\tan^2 x$

Understand It with Pulse | Flag a mistake

43 **Two positive numbers sum to 18. Their greatest possible product is**

ANSWER _____

Understand It with Pulse | Flag a mistake

44 **The volume formed by rotating $y = x^2$, $0 \le x \le 1$, about the x-axis is**

A $\frac{\pi}{5}$

B $\frac{\pi}{3}$

C π

D $\frac{2\pi}{5}$

Understand It with Pulse | Flag a mistake

45 The domain of $f(x) = \frac{x}{x^2 - 4}$ excludes

- **A** x = 0 only
- **B** x = 2 only
- **C** x = -2 only
- **D** x = 2 and x = -2

Understand It with Pulse | Flag a mistake

46 If f(x) = sin x, then f''(x) is

- **A** cos x
- **B** -sin x
- **C** sin x
- **D** -cos x

Understand It with Pulse | Flag a mistake

47 **The graph shows $f(x) = -x^2 + 4x$ with point P at (2, 4). The local maximum value shown is**

A 2

B 0

C 4

D 8

Understand It with Pulse | Flag a mistake

48 **The graph shows $y = 2x$. The area under the curve from $x = 0$ to $x = 2$ is**

A 4

B 2

C 8

D 6

Understand It with Pulse | Flag a mistake

49 $\lim_{x \to -\infty} \frac{x}{\sqrt{x^2 + 1}}$ is

- **A** 1
- **B** 0
- **C** -1
- **D** ∞

Understand It with Pulse | Flag a mistake

50 The graph shows $y = x^2$ with point P at (1, 1). The slope of the normal line at P is

- **A** 2
- **B** $-\frac{1}{2}$
- **C** $\frac{1}{2}$
- **D** -2

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ANSWER KEY

1. C
2. A
3. B
4. A
5. D
6. A
7. B
8. B
9. D
10. B
11. D
12. C
13. D
14. C
15. D
16. B
17. D
18. B
19. D
20. D
21. C
22. C
23. B
24. C
25. C
26. A
27. C
28. A
29. C
30. A
31. D
32. A
33. C
34. B
35. B
36. B
37. C
38. A
39. A
40. B
41. D
42. A
43. 81
44. A
45. D
46. B
47. C
48. A
49. C
50. B

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