1. **Differentiation**:
- If f(x) = ln(x^2 + 1), then the second derivative f''(x) is...
- A) (2 - 2x^2)/(x^2 + 1)^2 [Correct]
- B) (2x^2 - 2)/(x^2 + 1)^2
- C) (2x)/(x^2 + 1)
- D) (2x^2 + 2)/(x^2 + 1)^2

2. **Limits**:
- Evaluate the limit: lim x→0 (sin(2x)/x) = ...
- A) 2 [Correct]
- B) 1
- C) 0
- D) ∞

3. **Differentiation**:
- If y = tan^(-1)(x^2), find dy/dx when x = 1.
- A) 1 [Correct]
- B) 2
- C) 1/2
- D) 0

4. **Integration**:
- Evaluate the integral: ∫ (0 to π/2) sin^3(x) cos^2(x) dx.
- A) 1/12 [Correct]
- B) 1/6
- C) 1/8
- D) 1/10

5. **Differentiation**:
- If f(x) = e^(3x) and g(x) = ln(x), find (f ∘ g)'(x).
- A) 3x [Correct]
- B) 3/x
- C) 3x^2
- D) e^(3x)/x

6. **Differentiation**:
- If y = x^x, find dy/dx.

- A) $x^x(\ln(x) + 1)$ [Correct]
- B) $x^x \ln(x)$
- C) $x^{(x-1)}$
- D) $\ln(x) + 1$

7. **Differentiation**:
- If the function f is continuous on [0, 2] and differentiable on (0, 2), and f(0) = 1, f(2) = 3, find f'(c) for some c in (0, 2).
- A) 1 [Correct]
- B) 2
- C) 0
- D) 3

8. **Differentiation**:
- If $y = \ln(\sec(x))$, find dy/dx.
- A) $\tan(x)$ [Correct]
- B) $\sec(x)$
- C) $1/\cos(x)$
- D) $\sin(x)$

9. **Integration**:
- Solve for x: $\int_1^x (1/t)\, dt = 2$.
- A) e^2 [Correct]
- B) 2
- C) e
- D) $1/e^2$

10. **Functions**:
- If the function $g(x) = x^3 - 3x + 2$ has a local maximum at x = a, find the value of a.
- A) -1 [Correct]
- B) 1
- C) 0
- D) 2

11. **Differentiation**:
- If $f(x) = x^2 + 2x + 1$, find the inverse function $f^{-1}(x)$.
- A) $\sqrt{x} - 1$ [Correct]
- B) $-\sqrt{x} - 1$

- C) x - 1
- D) x^2 - 1

12. **Differentiation**:
- If y = cos(x) + sin(x), find the maximum value of y on the interval [0, π].
- A) √2 [Correct]
- B) 1
- C) 2
- D) √3

13. **Integration**:
- Determine the area enclosed by the curves y = x^2 and y = 2x.
- A) 4/3 [Correct]
- B) 2
- C) 8/3
- D) 1

14. **Differentiation**:
- If y = x^2 + 1/x, find the asymptotes of the curve.
- A) Vertical asymptote at x = 0 [Correct]
- B) Horizontal asymptote at y = 0
- C) Oblique asymptote at y = x
- D) No asymptotes

15. **Hard Question - Functions**:
- If f(x) = x^4 - 4x^3 + 6x^2 - 4x + 1, find the critical points and determine their nature.
- A) x = 1, point of inflection [Correct]
- B) x = 1, local minimum
- C) x = 1, local maximum
- D) No critical points

16. **Limits**:
- Evaluate the limit: lim x→∞ (x^2 - 3x + 2)/(2x^2 + 5).
- A) 1/2 [Correct]
- B) 1
- C) 0
- D) ∞

17. **Differentiation**:
- Determine the Taylor series expansion of f(x) = e^x centered at x = 0 up to the fourth degree.
- A) 1 + x + x^2/2 + x^3/6 + x^4/24 [Correct]
- B) 1 + x + x^2/2 + x^3/3 + x^4/4
- C) 1 + x + x^2 + x^3 + x^4
- D) 1 + x^2/2 + x^3/6 + x^4/24

18. **Differentiation**:
- If f(x) = sin(x) and g(x) = cos(x), find the points where f(x) = g(x) on the interval [0, 2π].
- A) π/4, 5π/4 [Correct]
- B) π/4, 3π/4
- C) π/2, 3π/2
- D) 0, π

19. **Functions**:
- If f(x) = |x - 1|, find the derivative f'(x) at x = 1.
- A) Does not exist [Correct]
- B) 0
- C) 1
- D) -1

20. **Differential Equations**:
- Solve the initial value problem: dy/dx = 3y, y(0) = 2.
- A) y = 2e^(3x) [Correct]
- B) y = 3e^(2x)
- C) y = 2e^(x)
- D) y = e^(3x)

21. **Geometry**:
- If the function h(x) = x^5 - 5x^3 + 4x has an inflection point at x = b, find b.
- A) √3/2 [Correct]
- B) 0
- C) 1
- D) √2/3

22. **Geometry**:

- Evaluate the integral: ∫ (0 to 1) e^(-x^2) dx.
- A) 0.7468 [Correct]
- B) 0.5
- C) 1
- D) 0.25