

1. Suppose  $g(x)$  is the inverse function of a differentiable function  $f(x)$  and  $G(x) = \frac{1}{g(x)}$ . If  $f(3) = 3$  and  $f'(3) = \frac{1}{9}$ , find  $G'(3)$ .

- a)  $G'(3) = 2$   
 b)  $G'(3) = -3$   
 c)  $G'(3) = -1$   
 d)  $G'(3) = -4$   
 e)  $G'(3) = 3$

2. Find the absolute maximum value of the function  $g(x) = \frac{e^{-3x}}{x}$  for  $x < 0$ .

- a)  $-4e$   
 b)  $4e^{-2}$   
 c)  $-2e$   
 d)  $-3e$   
 e)  $-\frac{2}{e}$

3. Expand  $\ln \sqrt{a(b^6 + c^2)}$ .

- a)  $\frac{\ln(a)}{2} + \frac{\ln(b^6 + c^2)}{2}$   
 b)  $\frac{\ln(a)}{2} + \frac{\ln(6b + 2c)}{2}$   
 c)  $2 \ln(a) - 2 \ln(b^6 + c^2)$   
 d)  $2 \ln(a) + 2 \ln(b^6 + c^2)$   
 e)  $\frac{1}{2} [\ln(a) \ln(b^6 + c^2)]$

4. Find the domain of the function  $F(x) = \sqrt{t} \ln(t^2 - 9)$ .

- a)  $(-\infty, \infty)$   
 b)  $(3, \infty)$   
 c)  $(0, \infty)$   
 d)  $(9, \infty)$   
 e)  $(-\infty, -3)$

5. Differentiate the function  $f(x) = \cos(\ln(5x))$ .

- a)  $f'(x) = \frac{1}{\cos(\ln(5x))}$   
 b)  $f'(x) = \frac{\sin(\ln(5x))}{x}$   
 c)  $f'(x) = -\sin(\ln(5x))$   
 d)  $f'(x) = -\frac{\sin(\ln(5x))}{x}$   
 e)  $f'(x) = -\frac{\sin(5x)}{5x}$

6. Evaluate the integral  $\int_e^8 \frac{dx}{x \ln x}$ .

- a)  $\ln(8) - 1$   
 b)  $\ln(\ln 8)$   
 c)  $e - \ln 8$   
 d)  $\ln(\ln 8) - 1$   
 e)  $\frac{1}{8} - \frac{1}{e}$

7. Find the derivative of the function  $y = 5 \sin^{-1}(x^2)$ .

- a)  $y' = \frac{10x}{\sqrt{1-x^4}}$   
 b)  $y' = \frac{2x}{\sqrt{1+x^4}}$   
 c)  $y' = \frac{10x}{\sqrt{1+x^4}}$   
 d)  $y' = \frac{10x}{\sqrt{1-x^2}}$   
 e)  $y' = \frac{-5x}{\sqrt{1-x^4}}$

8. Find the slope of the tangent line to the curve  $y = 3 \arccos\left(\frac{x}{2}\right)$  at the point  $(1, \pi)$ .

- a)  $-\sqrt{3}$   
 b)  $3$   
 c)  $-3$   
 d)  $\pi$   
 e)  $-\pi$

9. Evaluate the integral  $\int \theta \cos(\theta) d\theta$ .

- a)  $\theta \sin(\theta) + \cos(\theta) + C$
- b)  $\theta \cos(\theta) + \sin(\theta) + C$
- c)  $-\theta \sin(\theta) + C$
- d)  $\theta \sin(\theta) - \cos(\theta) + C$
- e)  $\sin(\theta) + \cos(\theta) + C$

13. (10 pts.) Use logarithmic differentiation to find the derivative of  $y = (\ln x)^{\cos x}$ .

10. Evaluate the integral  $\int_1^4 \sqrt{t} \ln t dt$ .

- a)  $16 \ln 16 - 16$
- b)  $\frac{16}{3} \ln 4 - 4$
- c)  $\frac{16}{3} \ln 4 - \frac{28}{9}$
- d)  $\frac{8}{3} \ln 4 - \frac{28}{9}$
- e)  $\frac{8}{3} \ln 4 - 4$

11. Evaluate the integral  $\int \sin^3 x \cos^2 x dx$ .

- a)  $\frac{1}{5} \sin^5 x - \frac{1}{3} \sin^3 x + C$
- b)  $-\frac{1}{5} \sin^5 x + \frac{1}{3} \sin^3 x + C$
- c)  $-\frac{1}{5} \cos^5 x + \frac{1}{3} \cos^3 x + C$
- d)  $\frac{1}{3} \cos^5 x - \frac{1}{5} \cos^3 x + C$
- e)  $\frac{1}{5} \cos^5 x - \frac{1}{3} \cos^3 x + C$

12. Evaluate the integral  $\int \frac{1 - \sin x}{\cos x} dx$ . [Hint:  $\int \sec x dx = \ln |\sec x + \tan x| + C$ .]

- a)  $\ln(1 + \cos x) + C$
- b)  $\ln|1 - \cos x| + C$
- c)  $\ln|\sin x| + C$
- d)  $\ln(1 + \sin x) + C$
- e)  $(x + \cos x) \ln|\sin x| + C$

14. (10 pts.) Evaluate the integral  $\int \frac{\sqrt{x^2 - 4}}{x^4} dx$ .

15. (10 pts.) Evaluate  $\int_0^4 \frac{x-1}{x^2-4x-5} dx$ .

16. (10 pts.) Evaluate the integral  $\int_{-1}^0 x^2 e^{-x} dx$ .

ITEM NO.	FORM:	A
1		C
2		D
3		A
4		B
5		D
6		B
7		A
8		A
9		A
10		C
11		E
12		D

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$$13. \quad \frac{dy}{dx} = (\ln(x))^{\cos(x)} \left[ -\sin(x) \ln(\ln(x)) + \frac{\cos(x)}{x \ln(x)} \right]$$

$$14. \quad \frac{1}{12} \frac{(x^2 - 4)^{\frac{3}{2}}}{x^3} + C$$

$$15. \quad -\left(\frac{1}{3}\right) \ln 5$$

$$16. \quad e - 2$$