

1. Find a formula for the inverse of the function $f(x) = 2 - 5x^3$.

a) $f^{-1}(x) = \left(\frac{2-x}{5}\right)^{\frac{1}{3}}$

b) $f^{-1}(x) = (5-2x)^{\frac{1}{3}}$

c) $f^{-1}(x) = \left(\frac{5-x}{2}\right)^{\frac{1}{3}}$

d) $f^{-1}(x) = 2 + \frac{5}{x^3}$

e) $f^{-1}(x) = (2+5x)^3$

2. Find an equation of the tangent line to the curve $y = 7e^{8x} \cos \pi x$ at the point $(0, 7)$.

a) $y = 24x + 7$

b) $y = 56x + 7$

c) $y = 24x + 6$

d) $y = 8x + 6$

e) $y = 15x + 7$

3. Evaluate the integral $\int_0^1 xe^{-x^2} dx$.

a) $\frac{1}{2}(1 - e^{-1})$

b) $\frac{1}{2}(e^{-1} - 1)$

c) $\frac{1}{3}(1 - e)$

d) $2(1 - e^{-1})$

e) $\frac{2}{3}(1 + e)$

4. Find the exact value of the expression $\log_6 0.3 + \log_6 720$.

a) 7

b) 0

c) -1

d) 3

e) 8

5. Find the inverse function for $y = e^{\sqrt[6]{x}}$.

a) $y = (\ln x)^6$

b) $y = \ln 6x$

c) $y = \ln x^6$

d) $y = 6 \ln x$

e) $y = \frac{1}{6} \ln x$

6. Differentiate the function $f(t) = \frac{8 + \ln t}{9 - \ln t}$.

a) $f'(t) = \frac{1 + 2 \ln t}{t(9 - \ln t)^2}$

b) $f'(t) = \frac{17}{t(9 - \ln t)^2}$

c) $f'(t) = \frac{-1}{t(9 - \ln t)^2}$

d) $f'(t) = \frac{8 + t}{9 - t}$

e) $f'(t) = \frac{8t + 1}{(9t - 1)^2}$

7. Differentiate the function $y = \ln(x^5 \sin^2(x))$.

a) $y' = \frac{5 \sin(x) + 2x \cos(x)}{x \sin(x)}$

b) $y' = \frac{5 \sin(x) - 2x}{x \sin(x)}$

c) $y' = \frac{5 \cos(x) + 2x \sin(x)}{x \cos(x)}$

d) $y' = \frac{5 \sin(x) + 2x \cos(x)}{x^5 \sin^2(x)}$

e) $y' = 5x^4 + 2 \sin(x) \cos(x)$

8. Find the derivative of the function $y = 3(\sin^{-1}(x))^2$.

a) $y = 6 \cos^{-1}(x)$

b) $y = \frac{2 \sin^{-1}(x)}{\sqrt{1-x^2}}$

c) $y' = \frac{6 \sin^{-1}(x)}{\sqrt{1+x^2}}$

d) $y' = \frac{6 \sin^{-1}(x)}{\sqrt[4]{1-x^2}}$

e) $y' = \frac{6 \sin^{-1}(x)}{\sqrt{1-x^2}}$

9. Evaluate the integral $\int_0^{\frac{\sqrt{3}}{2}} \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx$.

a) $\frac{\pi^2}{18}$

b) $-\frac{\pi^2}{9}$

c) $-\frac{\pi^2}{18}$

d) $\frac{\pi^2}{9}$

e) $\frac{\sqrt{3}}{2}$

10. Evaluate the integral $\int x^3 \ln x dx$.

a) $\frac{x^4}{4} \ln x + C$

b) $x^4 \ln x - \frac{x^4}{4} + C$

c) $3x^2 \ln x + C$

d) $\frac{x^4}{4} \ln x - \frac{x^4}{16} + C$

e) $x^4 \ln x + \frac{1}{x} + C$

11. Evaluate the integral $\int_0^3 t e^{-t} dt$.

a) $1 - \frac{e^3}{4}$

b) $1 + \frac{4}{e^3}$

c) $1 + \frac{e^3}{3}$

d) $1 - \frac{4}{e^3}$

e) $-9e^{-3}$

12. Evaluate the integral $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \cot^2 x dx$.

a) $\sqrt{3} - \frac{\pi}{3}$

b) $\frac{1}{\sqrt{3}} - \frac{\pi}{6}$

c) $\frac{1}{\sqrt{3}} + \frac{\pi}{6}$

d) $\sqrt{3} - \frac{\pi}{6}$

e) $\frac{\pi}{6}$

13. Find the area of the region bounded by the curves $y = \cos x$, $y = \cos^3 x$, $x = 0$ and $x = \frac{\pi}{2}$.

a) $\frac{1}{2}$

b) $\frac{2}{3}$

c) $\frac{1}{3}$

d) $\frac{\pi}{7}$

e) $\frac{\pi}{2}$

14. Evaluate the integral $\int \frac{x^2}{x+7} dx$.

a) $\frac{x^2}{2} - 7x + 49 \ln|x+7| + C$

b) $\frac{x^2}{2} + 7x + 49 \ln(x-7)^2 + C$

c) $\frac{x^2}{2} - 7x + 7 \ln|x+7| + C$

d) $\frac{x^2}{2} - 7x + 49 \ln(x+7)^2 + C$

e) $x - 7x + 49 \ln|x-7| + C$

15. (10 pts.) Use logarithmic differentiation to find the derivative of $y = (\sin x)^x$.
16. (10 pts.) Evaluate the integral $\int_0^2 \frac{x^2}{\sqrt{16-x^2}} dx$. (Hint: $\sin^2 \theta = \frac{1}{2}(1 - \cos 2\theta)$.)

17. (10 pts.) Evaluate $\int \frac{5x-3}{x^2-2x-3} dx$.

ITEM NO. FORM: A

1	A
2	B
3	A
4	D
5	A
6	B
7	A
8	E
9	A
10	D
11	D
12	B
13	C
14	A

15. $y' = (\sin x)^x [x \cot x + \ln(\sin x)]$

16. $\frac{4}{3}\pi - 2\sqrt{3}$

17. $3\ln|x-3| + 2\ln|x+1| + C$