

MCS22 – Calculus
Exam 4 Review Sheet

In 1 – 14, find $\frac{dy}{dx}$ in simplest form.

1. $y = e^{3x}$

2. $y = \ln 4x^2$

3. $y = \ln\left(\frac{e^x - 1}{e^x}\right)$

4. $y = \frac{1}{\ln x^2}$

5. $y = \sin^3(\ln x)$

6. $y = 3^{x^2+4x}$

7. $y = 5^{\cos x}$

8. $y = \ln(e^{2x} + 1)^2$

9. $y = 3x^4 e^x$

10. $y = \frac{e^x}{\ln x}$

11. $y = e^{-\frac{x}{3}}$

12. $y = 4e^2 + 10^{5e^2+4x}$

13. $y = e^x \sec x^2$

14. $y = e^{x \tan(\ln x)}$

In 15 – 16, use logarithmic differentiation to find $\frac{dy}{dx}$.

15. $y = x^{\sec x}$

16. $y = \frac{x^5 \sqrt{2x-3}}{(10x-7)^{11}}$

17. Given the position function $x(t) = t^4 - 8t^2$, find the distance that the particle travels from $t = 0$ to $t = 4$.

18. Given the position function $s(t) = \frac{4}{3}t^3 - 2t^2 - 8t$, $t \geq 0$, find:

- the interval(s) where the particle is speeding up
- the interval(s) where the particle is slowing down
- the acceleration when the particle reverses direction

19. Find $\frac{dy}{dx}$ for each:

(a) $y = \log_6 x$

(b) $y = \log(x^4 - 8x^2)$