

1. Use your calculator to evaluate (correct to 1 decimal place):
 (a) $e^{2.63}$ (b) $e^{-0.7}$ (c) $4e^{-5.6}$ (d) $\frac{e^6}{5}$ (e) $\log_e 5$ (f) $\log_e 2.7$
2. Draw the graph of $y = e^x$ for $-1 \leq x \leq 3$ and show that the gradient for the tangent at $(0, 1)$ is 1.
3. (a) On the same set of axes draw the graphs of $y = e^x$ and of $y = e^{-x}$ for $-3 \leq x \leq 3$.
 (b) By adding the ordinates of the above graphs draw the graph of $y = e^x + e^{-x}$ on the same axes.
4. Differentiate the following with respect to x .
 (a) e^{-3x} (b) $e^{5x} + 5x^2 + 2$ (c) $e^{-\sqrt{2}}$ (d) $x^3 e^{2x}$ (e) $\frac{e^x + 1}{2x}$
5. Show that the tangent to the curve $y = 2e^x$, at the point where $x = 2$, is parallel to the tangent to the curve $y = 2^{2x}$ at the point where $x = 1$.
6. If $y = 4e^{-x} + 5e^{-3x}$, show that $\frac{d^2y}{dx^2} + \frac{dy}{dx} + 3y = 0$.
7. Integrate with respect to x . (a) e^{4x} (b) $3x^2 + e^{2x}$ (c) $\frac{e^{-2x}}{4}$
8. Evaluate these definite integrals to 3 decimal places:
 (a) $\int_0^1 e^{3x} dx$ (b) $\int_1^2 xe^{-x^2} dx$ (c) $\int_0^2 \frac{1}{2}(e^x + e^{-x}) dx$
9. (a) On the same set of axes, sketch the curves $y = e^{-x}$ and $y = e^{2x}$.
 (b) Hence, calculate the area between the curves from $x = 0$ to $x = 1$.
10. Given that $\log_e 2 = 0.693$ and $\log_e 3 = 1.099$, find the value of the following correct to 2 decimal places:
 (a) $\log_e 4$ (b) $\log_e 1.5$ (c) $\log_e 18$ (d) $\log_e 27$ (e) $\log_e 3e$
11. Use your knowledge of indices (powers of 2 and 3) to find:
 (a) $\log_2 128$ (b) $\log_3 9\sqrt{3}$ (c) $\log_2 \sqrt{2}$ (d) $\log_2 64$ (e) $e^{\log_3 81}$
12. Write $3\log x + 2\log y - \frac{1}{2}\log z$ as a single logarithm.
13. Solve the equations: (a) $e^{\log x} = \log 2$ (b) $e^{\log 3x} = 6$
14. Differentiate: (a) $\log(3x + 1)$ (b) $\log[(x + 2)(x - 3)]$ (c) $\ln \sqrt{x + 4}$ (d) $2x^3 \ln(x - 2)$
15. Show that the maximum value of $y = x \log x$ is $-\frac{1}{e}$.
16. Find: (a) $\int \frac{1}{6x - 7} dx$ (b) $\int \frac{2x^3}{x^3 + 3} dx$ (c) $\int \frac{5x^2 + 7x - 6}{x^2} dx$ (d) $\int \left(x + \frac{1}{x^2}\right)^2 dx$
17. Evaluate: (a) $\int_1^e \left(2t + \frac{2}{t}\right) dt$ (b) $\int_0^2 \frac{x}{x^2 + 1} dx$
18. (a) Show that $\frac{x+7}{x-1} = 1 + \frac{8}{x-1}$
 (b) Hence show that $\int_2^{e+1} \frac{x+7}{x-1} dx = e + 7$
19. The region under the curve $y = \sqrt{\frac{2x}{x^2 + 1}}$ and bounded by the lines $x = 0$ and $x = 1$ is rotated about the x -axis. Find the volume of the solid of revolution.
20. (a) If $y = 5^x$ find $\frac{dy}{dx}$
 (b) Find $\int 10^x dx$
21. Use the fact that $\log_e 8.2 = 2.104$ and $\log_e 10 = 2.3026$ to find $\log_{10} 8.2$. Give your answer correct to 3 decimal places.