The Exponential Function e^x

Specification: AQA 7357: F1, F2, B9 · Edexcel 9MA0: 6.1, 6.2, 2.9

HOMEWORK Consolidation

1 Differentiate $y = 7e^{3x} - 2e^{-x}$.
AQA F2 · Edexcel 6.2

2 Sketch $y = 1 - e^x$. State where it crosses the axes and the equation of the asymptote.
AQA F1, B9 · Edexcel 6.1, 2.9

3 Find the exact gradient of $y = e^{x/3}$ at $x = 3$.
AQA F2 · Edexcel 6.2

4 The curve $y = Ae^{kx}$ passes through $(0, 4)$ with gradient 10 at that point. Find A and k.
AQA F2 · Edexcel 6.2

5 For $y = 2^x$, $\frac{dy}{dx} = 0.693\ldots \times 2^x$. Compare the gradients of $y = 2^x$ and $y = e^x$ where they cross the y-axis.
AQA F1, B1 · Edexcel 6.1, 2.1

6 (a) Find the equation of the tangent to $y = e^{-x}$ at $x = 0$.
(b) Where does the tangent cross the x-axis?
AQA F2 · Edexcel 6.2

7 Show that $y = e^x - ex$ has a stationary point at $(1, 0)$, and determine its nature.
AQA F2 · Edexcel 6.2

8 Describe the transformation that maps $y = e^x$ onto $y = e^{x-2}$, and give the exact y-intercept.
AQA F1, B9 · Edexcel 6.1, 2.9

9 (a) Write e^{2x+3} in the form Ae^{2x}.
(b) Hence differentiate $y = e^{2x+3}$.
AQA F1, B1 · Edexcel 6.1, 2.1

10 A population is modelled by $P = 200e^{0.05t}$.
(a) Show that $\frac{dP}{dt} = 0.05P$.
(b) Find the rate of growth when $P = 400$.
AQA F2, F7 · Edexcel 6.2, 6.7

11 *Edexcel-style.* $f(x) = 3e^{2x} + 1$.
(a) Sketch $y = f(x)$, showing the y-intercept and the equation of the asymptote. [3 marks]
(b) Find $f'(x)$. [1 mark]
(c) Find the equation of the tangent to $y = f(x)$ at $x = 0$. [2 marks]
(d) Find the coordinates of the point where this tangent meets the asymptote. [1 mark]
AQA F1, B9 · Edexcel 6.1, 2.9 · Edexcel-style

12 *AQA-style.* A curve has equation $y = 4e^{x/2} - x^2$.
(a) Find $\frac{dy}{dx}$. [2 marks]
(b) Find the gradient of the curve at the point where it crosses the y-axis. [1 mark]
(c) Find the equation of the normal to the curve at this point. [3 marks]
AQA F2 · Edexcel 6.2 · AQA-style