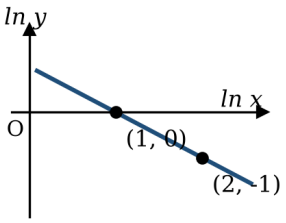
Day 211	A Level Maths: A Tier 10-a-day
1 The probability that a biased coin lands heads is 0.4. In 19 independent trials, find the probability that this happens (a) exactly 8 times (b) fewer than 8 times (c) at least 8 times.	
2 Find the quotient and the remainder when $3x^3 - 11x^2 - 20x + 4$ is divided by $(3x + 4)$.	
3 Solve $e^{2x} - 15e^x + 54 = 0$, giving exact answers.	
4 A particle P has position vector $\mathbf{r} = (t^3 + 6t)\mathbf{i} + (3t^2 - 12t)\mathbf{j}$ metres at time t s. Find (a) the speed of P when t = 3, (b) the value of t when P is moving parallel to $\mathbf{i}$. Give answers to 3 s.f. if not exact.	
5 X ~ B(27, 0.1). Find the largest value of c such that $P(X \leq c) < 0.1$.	

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6 The diagram shows the graph of ln y against ln x for $y = A x^n$.
Find the value of n and the exact value of A.



7 A 4 kg block is released from rest on a rough plane inclined at α, $\tan\alpha = \frac{4}{3}$, μ = 0.5, and slides 10 m down a line of greatest slope. Use work and energy to find (a) the work done against friction, (b) its speed after 10 m. Take g = 10.

8 Solve $|x + 8| > |-4x + 8|$.

9 (a) Expand $(1 + 2x)^{\frac{1}{2}}$ in ascending powers of x up to x^2.
(b) Use x = 0.005 to estimate $\sqrt{101}$ to 4 decimal places.

10 θ is acute and $\tan\theta = 2$.
Show that $\cos 2\theta = -\frac{3}{5}$ and find the exact value of $\sin 2\theta$.