Day 127	A Level Maths: B Tier 10-a-day
1 Solve $e^{2x} - e^{x} - 12 = 0$, giving any answers as exact values.	
2 8 values of x are coded using $y = \frac{(x - 100)}{5}$. $\Sigma y = 9$ and $\Sigma y^2 = 239$. Find the mean and standard deviation of x (3 s.f.).	
3 A lorry travelling at 10 m s^{-1} brakes and comes to rest with constant deceleration 4 m s^{-2}. Find (a) the distance travelled while braking, (b) the time taken to stop.	
4 Find the quotient and the remainder when $-x^3 + 2x^2 + 10x + 8$ is divided by $(x + 1)$.	
5 60 customers: 26 buy coffee, 23 buy tea, 18 do neither. (a) How many do both? (b) Given a person who buys coffee, find P(this person buys tea).	

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6 A uniform rod AB of length 2 m and mass 6 kg is hinged at A and held horizontal by a light string attached at B.
The string makes an angle θ with the rod, where $\sin\theta = \frac{3}{5}$. Take g = 9.8 m s^{-2}. Find the tension in the string.

7 A cup of tea cools in a room at 10°C: $\frac{dT}{dt} = -k(T - 10)$. Initially T = 70 and after 5 minutes T = 60.
Find k to 3 s.f. and the time to cool to 20°C, to 3 s.f.

8 A sequence is defined by $u_{n+1} = \frac{1}{1 - u_n}$, $u_1 = -1$.
(a) Show that the sequence is periodic, stating the period.
(b) Find u_{25} and $\sum_{r=1}^{25} u_r$.

9 Given that $12\cos\theta + 5\sin\theta \equiv 13\cos(\theta - 22.6°)$,
solve $12\cos\theta + 5\sin\theta = -1$ for $0 \leq \theta \leq 360°$. (1 d.p.)

10 Solve $x(x + 3)(x - 4) > 0$.