# Term 2 Week 7

1. Find all polynomials $f(x)$ such that $f(2x) = f'(x).f''(x)$

2. Let $x, y$ and $z$ be three 3-digit Real numbers that, between them, contain all the digits from 1-9.
   If:

   - $x + y = z$
   - $z$ is a power of a prime
   - Each digit of $x$ is higher than the corresponding digit of $y$

   Find $x, y$ and $z$.

3. Suppose you have forgotten the formulas for the sine and cosine of a sum and a difference, but do remember the formula $e^{z+w} = e^z e^w$, with $z, w \in \mathbb{C}$.
   Use this formula to find formulas for $\cos(A - B)$ and $\sin(A + B)$ with A and B real.

   Note: for this problem use Euler's Formula to represent a complex number in polar form:

   $$e^{i\theta} = \cos\theta + i\sin\theta$$

4. $\int \sin^2(x)\cos^2(x)dx$