

Solution Sheet 13, August 20, 2012

Answers

1. $2083\frac{1}{3}$ profit
2. $\pi z z a$
3. Construct a triangle ABD with sides of length a, b, d such that $\angle ADB = 90^\circ$. Show that $d = c$.
4.
$$31^{24} < 32^{24} = 2^{5 \cdot 24} = 2^{120} = 2^{8 \cdot 15} = 256^{15} < 257^{15}$$
5. (a) Conjecture that $S_n = 2^n(2n - 1)(2n - 3) \cdots (5)(3)(1)$ - that is, 2^n times all the odd numbers from $2n - 1$ down to 1. Since every factor aside from 2^n is odd, the power of 2 in the prime factorisation is n .
(b) First prove $S_n = 2(2n - 1)S_{n-1}$. Use this to prove our conjecture.