

**A Level H2 Math**

**Equations and Inequalities Test 3**

Q1  
Mr Subash returned to Singapore after his tour in Europe and wishes to convert his foreign currencies back to Singapore Dollars (S\$). Three money changers offer the following exchange rates:

Money Changer	1 Swiss Franc	1 British Pound	1 Euro	Total amount of S\$ Mr Subash would receive after currency conversion
A	S\$1.35	S\$1.80	S\$1.55	S\$1151.50
B	S\$1.40	S\$1.85	S\$1.65	S\$1208.25
C	S\$1.45	S\$1.75	S\$1.60	S\$1189.25

How much of each currency has Mr Subash left after his tour? [4]

Q2  
Mr Tan invested a total of \$25,000 in a structured deposit account, bonds and an estate fund. He invested \$7,000 more in bonds than in estate fund. The projected annual interest rates for structured deposit account, bonds and estate fund are 2%, 3% and 4.5% respectively. Money that is not drawn out at the end of the year will be re-invested for the following year.

Mr Tan plans to draw out his money from all investments at the end of the second year and estimates that he will receive a total of \$26,300. Find the amount of money Mr Tan invested in each investment, giving your answer to the nearest dollar. [5]

Q3  
Solve the inequality  $\frac{2x^2 + 2x - 1}{x^2 + 2x} \leq 1$ .  
Hence, solve the inequality  $\frac{2x^2 + 2|x| - 1}{x^2 + 2|x|} \leq 1$ . [6]

**Answers**

**Equations and Inequalities Test 3**

Q1

Let  $x$ ,  $y$  and  $z$  be the amount of Francs, Pounds & Euro Mr Subash has left respectively.

$$1.35x + 1.80y + 1.55z = 1151.50$$

$$1.40x + 1.85y + 1.65z = 1208.25$$

$$1.45x + 1.75y + 1.60z = 1189.25$$

Using GC,  $x = 250$ ,  $y = 125$ ,  $z = 380$ .

He has 250 francs, 125 pounds and 380 euros left.

Q2

Let  $x$ ,  $y$  and  $z$  be the amounts Mr Tan invested in structured deposit account, bonds and an estate fund respectively.

$$x + y + z = 25000 \text{ --- (1)}$$

$$y = z + 7000 \text{ --- (2)}$$

$$[(1.02x) \times 1.02] + [(1.03y) \times 1.03] + [(1.045z) \times 1.045] = 26300 \text{ --- (3)}$$

Solving the 3 simultaneous equations :

$$x = 13937.6 = 13938 \text{ (nearest dollars),}$$

$$y = 9031.2 \approx 9031,$$

$$z = 2031.2 \approx 2031$$

Q3

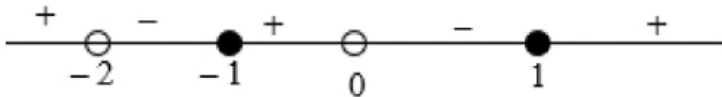
$$\frac{2x^2 + 2x - 1}{x^2 + 2x} \leq 1$$

$$\frac{2x^2 + 2x - 1}{x^2 + 2x} - 1 \leq 0$$

$$\frac{2x^2 + 2x - 1 - x^2 - 2x}{x^2 + 2x} \leq 0$$

$$\Rightarrow \frac{x^2 - 1}{x(x+2)} \leq 0$$

$$\Rightarrow \frac{(x+1)(x-1)}{x(x+2)} \leq 0$$



Thus,  $-2 < x \leq -1$  or  $0 < x \leq 1$

Replacing  $x$  with  $|x|$ ,

$$-2 < |x| \leq -1 \text{ or } 0 < |x| \leq 1$$

$$-2 < |x| \leq -1 \Rightarrow \text{no solution}$$

For  $0 < |x| \leq 1$ ,

$$0 < |x| \text{ and } |x| \leq 1$$

$$x \in \mathbb{R}, x \neq 0 \text{ and } -1 \leq x \leq 1$$

Thus, range of values:  $-1 \leq x \leq 1, x \neq 0$