Hong Kong Mathematics Olympiad (2001 – 2002)
Final Event 1 (Group)
香港数学竞赛 (2001 – 2002)
决赛项目 1 (团体)

除非特别声明，答案须用数字表达，并化至最简。
Unless otherwise stated, all answers should be expressed in numerals in their simplest forms.

1. 假设曲线 $x^2+3y^2=12$ 及直线 $mx+y=16$ 只相交于一点。若 $a=m^2$，求 a 的值。

   Assume that the curve $x^2+3y^2=12$ and the straight line $mx+y=16$ intersect at only one point. If $a=m^2$, find the value of a.

   $a =$

2. 已知 $x+y=1$ 及 $x^2+y^2=2$。若 $x^3+y^3=b$，求 b 的值。

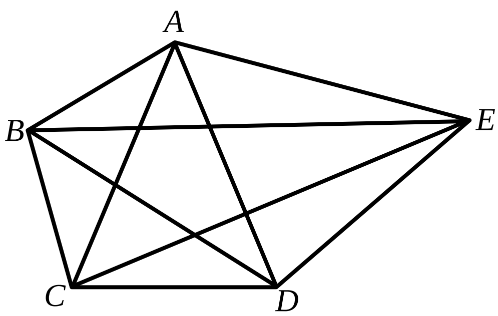
   It is given that $x+y=1$ and $x^2+y^2=2$. If $x^3+y^3=b$, find the value of b.

   $b =$

3. 在下图中，$AC=AD=AE=ED=DB$ 及 $\angle BEC=c°$。已知 $\angle BDC=26°$ 及 $\angle ADB=46°$，求 c 的值。

   In the following figure, $AC=AD=AE=ED=DB$ and $\angle BEC=c°$. Given that $\angle BDC=26°$ and $\angle ADB=46°$, find the value of c.

   $c =$



4. 已知 $4\cos^4\theta+5\sin^2\theta-4=0$，其中 $0°<\theta<360°$。若 θ 的最大值为 d，求 d 的值。

It is given that $4\cos^4\theta+5\sin^2\theta-4=0$, where $0°<\theta<360°$. If the maximum value of θ is d, find the value of d.

$d=$

Hong Kong Mathematics Olympiad (2001 – 2002)

Final Event 2 (Group)

香港数学竞赛 **(2001 – 2002)**

决赛项目 **2 (**团体**)**

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1. 已知三角形三边的长分别为 6、8 和 10。若这三角形的面积为 a，求 a 的值。

It is given that the lengths of the sides of a triangle are 6, 8 and 10. If the area of the triangle is a, find the value of a.

$a =$

2. 已知 $f\left(x+\frac{1}{x}\right)=x^3+\frac{1}{x^3}$。若 $f(4)=b$，求 b 的值。

Given that $f\left(x+\frac{1}{x}\right)=x^3+\frac{1}{x^3}$ and $f(4)=b$, find the value of b.

$b =$

3. 已知 $2002^2-2001^2+2000^2-1999^2+\cdots+4^2-3^2+2^2-1^2=c$，求 c 的值。

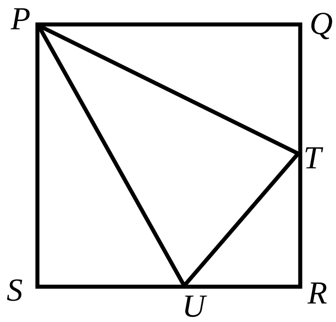
Given that $2002^2-2001^2+2000^2-1999^2+\cdots+4^2-3^2+2^2-1^2=c$, find the value of c.

$c =$

4. $PQRS$ 为一正方形，PTU 为一等腰三角形及 $\angle TPU = 30^\circ$。T 及 U 分别为 QR 及 RS 上的点。ΔPTU 之面积为 1。若正方形 $PQRS$ 之面积为 d，求 d 的值。

$PQRS$ is a square, PTU is an isosceles triangle, and $\angle TPU = 30^\circ$. Points T and U lie on QR and RS respectively. The area of ΔPTU is 1. If the area of $PQRS$ is d, find the value of d.

$d =$



Hong Kong Mathematics Olympiad (2001 – 2002)

Final Event 3 (Group)

香港数学竞赛 (2001 – 2002)

决赛项目 3 (团体)

除非特别声明，答案须用数字表达，并化至最简。
Unless otherwise stated, all answers should be expressed in numerals in their simplest forms.

1. 若 $\dfrac{2002^3+4\times 2002^2+6006}{2002^2+2002}=a$，求 a 的值。

If $\dfrac{2002^3+4\times 2002^2+6006}{2002^2+2002}=a$, find the value of a.

$a=$

2. 已知 x 和 y 为两实数且满足关系 $y=\dfrac{x}{2x-1}$。若 $\dfrac{1}{x^2}+\dfrac{1}{y^2}$ 的最小值为 b，求 b 的值。

It is given that the real numbers x and y satisfy the relation $y=\dfrac{x}{2x-1}$. If the minimum value of $\dfrac{1}{x^2}+\dfrac{1}{y^2}$ is b, find the value of b.

$b=$

3. 从 50 个正整数 1，2，3 ⋯ 50 中任意抽两个不同的数。已知两数之和不少于 50。若抽取这两数共有 c 种取法，求 c 的值。

Suppose two different numbers are chosen randomly from the 50 positive integers 1 , 2 , 3 , … 50 , and the sum of these two numbers is not less than 50 . If the number of ways of choosing these two numbers is c, find the value of c.

$c=$

4. 已知 $x-y=1+\sqrt{5}$， $y-z=1-\sqrt{5}$。若 $x^2+y^2+z^2-xy-yz-zx=d$，求 d 的值。

Given that $x-y=1+\sqrt{5}$, $y-z=1-\sqrt{5}$. If $x^2+y^2+z^2-xy-yz-zx=d$, find the value of d.

$d=$

Hong Kong Mathematics Olympiad (2001 – 2002)

Final Event 4 (Group)

香港数学竞赛 (2001 – 2002)

决赛项目 4 (团体)

除非特别声明，答案须用数字表达，并化至最简。
Unless otherwise stated, all answers should be expressed in numerals in their simplest forms.

1. 若 a 是 2002 的所有正因子之和，求 a 的值。

If a is the sum of all the positive factors of 2002, find the value of a.

$a =$

2. 设 $x > 0$，$y > 0$ 且 $\sqrt{x}(\sqrt{x}+\sqrt{y}) = 3\sqrt{y}(\sqrt{x}+5\sqrt{y})$。若 $b = \dfrac{2x+\sqrt{xy}+3y}{x+\sqrt{xy}-y}$，求 b 的值。

It is given that $x > 0$, $y > 0$ and $\sqrt{x}(\sqrt{x}+\sqrt{y}) = 3\sqrt{y}(\sqrt{x}+5\sqrt{y})$. If $b = \dfrac{2x+\sqrt{xy}+3y}{x+\sqrt{xy}-y}$, find the value of b.

$b =$

3. 若方程 $||x-2|-1| = c$ 只有 3 个整数解，求 c 的值。

Given that the equation $||x-2|-1| = c$ has only 3 integral solutions, find the value of c.

$c =$

4. 若 d 是方程 $\dfrac{1}{2}\left\{\dfrac{1}{2}\left[\dfrac{1}{2}\left(\dfrac{1}{2}x^2+2\right)+2\right]+2\right\} = 2$ 的正实数解，求 d 的值。

If d is the positive real root of the equation $\dfrac{1}{2}\left\{\dfrac{1}{2}\left[\dfrac{1}{2}\left(\dfrac{1}{2}x^2+2\right)+2\right]+2\right\} = 2$, find the value of d.

$d =$