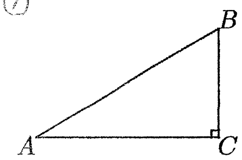
中学３年数学α２学期期末考査　1,2 組＿＿番氏名 解答　(15/12/07)

答えが２つある or １つしかないの判断は各自で行うこと

1 公式を書きなさい。(8 点)

①(1) 三平方の定理



$AB^2 = AC^2 + BC^2$

①(2) $ax^2 + bx + c = 0$ の解の公式

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

②(3) 正弦定理

$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C} = 2R$

②(4) 余弦定理

$c^2 = a^2 + b^2 - 2ab\cos C$

②(5) 余弦定理

$\cos B = \dfrac{a^2 + c^2 - b^2}{2ac}$

2 計算しなさい。(10 点) 各2

(1) $\frac{2x+4}{3} - \frac{7x-5}{2}$

$= \frac{1}{6}\{2(2x+4) - 3(7x-5)\}$

$= \frac{1}{6}(4x+8-21x+15)$

$= \frac{1}{6}(-17x+23) = \dfrac{-17x+23}{6}$

(2) $\sqrt{12} - 3\sqrt{7} - 2\sqrt{3} + 4\sqrt{7}$

$= 2\sqrt{3} - 3\sqrt{7} - 2\sqrt{3} + 4\sqrt{7}$

$= \sqrt{7}$

(3) $(\sqrt{6} - \sqrt{2})^2$

$= 6 - 2\sqrt{12} + 2$

$= 8 - 4\sqrt{3}$

(4) $\frac{3^2+5^2-4^2}{2\times3\times5}$

$= \dfrac{9+25-16}{2\cdot3\cdot5} = \dfrac{\cancel{18}^{3}}{2\cdot3\cdot5} = \dfrac{3}{5}$

(5) $(2x-3y)(2x+3y)$

$= 4x^2 - 9y^2$

3 方程式不等式を解きなさい。(6 点) 各2

(1) $\frac{7}{12}x = \frac{5}{3}$

$x = \frac{5}{3} \times \frac{12^{4}}{7} = \dfrac{20}{7}$

(2) $-4x + 3 \leqq 2x - 1$

$-4x - 2x \leqq -1 - 3$

$-6x \leqq -4$

$x \geqq \frac{2}{3}$

(3) $x^2 - 5x - 1 = 0$

$x = \dfrac{5 \pm \sqrt{25+4}}{2}$

$x = \dfrac{5 \pm \sqrt{29}}{2}$

4 因数分解しなさい。(6 点) 各2

(1) $x^2 - 2015x + 2014$

$= (x-2014)(x-1)$

(2) $16x^2 - 25$

$= (4x+5)(4x-5)$

(3) $3x^2 - 4x - 15$

$= (3x+5)(x-3)$

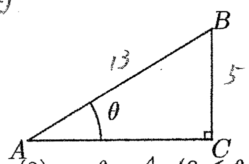
$\begin{array}{ccc} 3 & 5 & 5 \\ 1 & -3 & -9 \\ \hline 3 & -15 & -4 \end{array}$

5 次の θ に対して $\sin\theta$ の値を求めなさい。(12 点)

②(1) $\theta = 60°$ (答のみ)

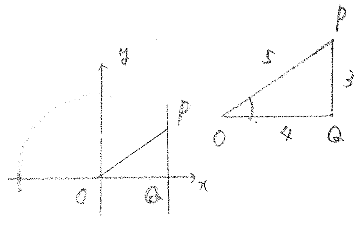
$\sin\theta = \frac{\sqrt{3}}{2}$

②(2) $AB = 13, BC = 5$



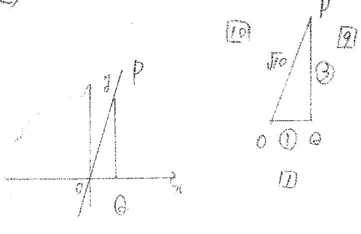
$\sin\theta = \dfrac{5}{13}$

④(3) $\cos\theta = \frac{4}{5}$　$(0 \leqq \theta \leqq 180°)$



$\sin\theta = \dfrac{3}{5}$

④(4) $\tan\theta = 3$　$(0 \leqq \theta \leqq 180°)$



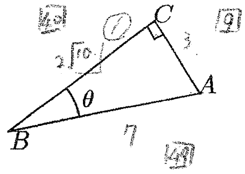
$\sin\theta = \dfrac{3}{\sqrt{10}}$

6 次の θ に対して $\cos\theta$ の値を求めなさい。(12 点)

② (1) $\theta = 45°$ (答のみ)

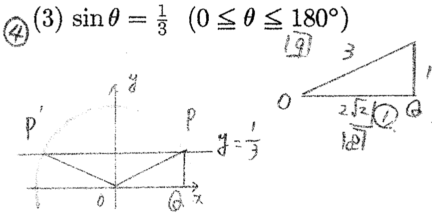
$\cos\theta = \frac{1}{\sqrt{2}}$

② (2) $AB = 7, AC = 3$



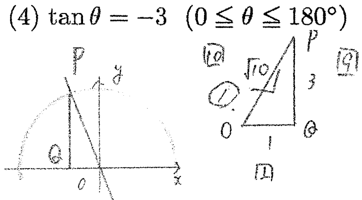
$\cos\theta = \frac{2\sqrt{10}}{7}$

④ (3) $\sin\theta = \frac{1}{3}$ $(0 \leqq \theta \leqq 180°)$



$\cos\theta = \pm\frac{2}{3}\sqrt{2}$

④ (4) $\tan\theta = -3$ $(0 \leqq \theta \leqq 180°)$



$\cos\theta = -\frac{1}{\sqrt{10}}$

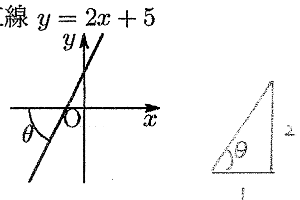
答のみ (−1)

7 次の θ に対して $\tan\theta$ の値を求めなさい。(12 点)

② (1) $\theta = 135°$ (答のみ)

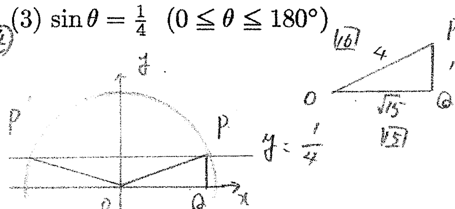
$\tan\theta = -1$

② (2) 直線 $y = 2x + 5$



$\tan\theta = 2$

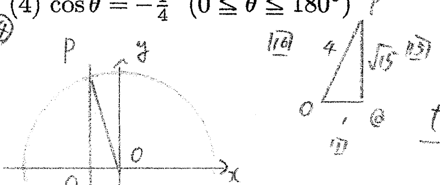
④ (3) $\sin\theta = \frac{1}{4}$ $(0 \leqq \theta \leqq 180°)$



答のみ③

$\tan\theta = \pm\frac{1}{\sqrt{15}}$

④ (4) $\cos\theta = -\frac{1}{4}$ $(0 \leqq \theta \leqq 180°)$

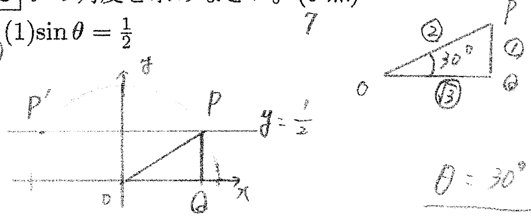


答のみ③

$\tan\theta = -\sqrt{15}$

8 θ の角度を求めなさい。(~~9~~ 7 点)

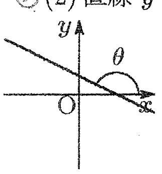
④ (1) $\sin\theta = \frac{1}{2}$



答のみ③

$\theta = 30°, 150°$

③ (2) 直線 $y = -\frac{1}{\sqrt{3}}x + 3$



$\tan\theta = -\frac{1}{\sqrt{3}}$ より

答のみ②

$\theta = 150°$

9 $\triangle ABC$ について次の値を求めよ。(~~12~~ 15 点)

③ (1) $A = 45°, B = 30°, b = 3$ のときの a

$\frac{a}{\sin 45°} = \frac{3}{\sin 30°}$ ①

$\frac{a}{\frac{1}{\sqrt{2}}} = \frac{3}{\frac{1}{2}}$ ②

$\frac{1}{2}a = \frac{3}{\sqrt{2}}$

$a = \frac{6}{\sqrt{2}}$

$a = 3\sqrt{2}$

④ (2) $B = 70°, C = 50°, a = 10$ のときの外接円半径 R

$\angle A = 180° - 70° - 50° = 60°$ ①

$\frac{10}{\sin 60°} = 2R$

$\frac{10}{\frac{\sqrt{3}}{2}} = 2R$ ②

$\sqrt{3}R = 10$

$R = \frac{10}{3}\sqrt{3}$

④ (3) $a = 1 + \sqrt{3}, b = 2, C = 60°$ のときの c

$c^2 = (1+\sqrt{3})^2 + 2^2 - 2\cdot(1+\sqrt{3})\cdot 2\cdot\cos 60°$ ①

$= 1 + 2\sqrt{3} + 3 + 4 - 2(1+\sqrt{3})$

$= 1 + 2\sqrt{3} + 3 + 4 - 2 - 2\sqrt{3}$

$= 6$

$c > 0$ より

$c = \sqrt{6}$

④ (4) $a = 2\sqrt{7}, c = 2, \cancel{C}A = 120°$ のときの b

$(2\sqrt{7})^2 = b^2 + 2^2 - 2\cdot 2\cdot b\cdot\cos 120°$

$28 = b^2 + 4 + 2b$

$b^2 + 2b - 24 = 0$ ②

$(b+6)(b-4) = 0$

$b = -6, 4$

$b > 0$ より

$b = 4$

10 大きい方に○をつけその理由を述べよ。(~~13~~ 12 点)

② (1) $\sqrt{13}$ と 4

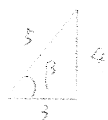
理由

④ 2乗すると 13 と 16 だから

② (2) $\cos\alpha = \frac{1}{\sqrt{2}}, \cos\beta = \frac{3}{5}$ について α と β

理由

④ $\alpha = 45°$



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答えが２つある or １つしかないの判断は各自で行うこと

$\boxed{1}$ 公式を書きなさい。(6点) 各2

(1) 正弦定理

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$$

(2) 余弦定理

$$c^2 = a^2 + b^2 - 2ab\cos C$$

(3) 余弦定理

$$\cos B = \frac{a^2+c^2-b^2}{2ac}$$

$\boxed{2}$ 計算せよ。(6点) 各2

(1) $\frac{2x+4}{3} - \frac{7x-5}{2}$

$= \frac{1}{6}\{2(2x+4) - 3(7x-5)\}$

$= \frac{1}{6}(4x+8-21x+15)$

$= \frac{1}{6}(-17x+23)$ 　 $\frac{-17x+23}{6}$

(2) $(\sqrt{6}-\sqrt{2})^2$

$= 6 - 2\sqrt{12} + 2$

$= 8 - 4\sqrt{3}$

(3) $\frac{3^2+5^2-4^2}{2\times3\times5}$

$= \frac{9+25-16}{2\cdot3\cdot5} = \frac{\cancel{18}\,3}{\cancel{2\cdot3\cdot5}} = \frac{3}{5}$

$\boxed{3}$ 大きい方に○をつけその理由を述べよ。(16点)　α, β は鋭角

② (1) $\sqrt{13}$ と 4

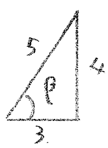
理由

② 2乗すると 13と16 だから

② (2) $\cos\alpha = \frac{1}{\sqrt{2}}, \cos\beta = \frac{3}{5}$ について　α と β

理由

④ $\alpha = 45°$



② (3) $\sin\alpha = \frac{4}{\sqrt{29}}, \cos\beta = \frac{4}{\sqrt{29}}$ について　α と β

理由

④ $\cos\alpha = \frac{\sqrt{13}}{\sqrt{29}}$ 　(1) より $\sqrt{13} < 4$

$\cos\theta$ は x 座標を見るので

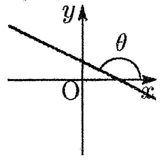
値が小さい方が角度は大きくなるから

$\boxed{4}$ θ の角度を求めなさい。(9点)

② (1) 正十二角形の内角の１つ (答のみ)

$\frac{(12-2)\times180}{12} = 150°$

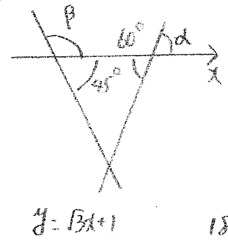
③ (2) 直線 $y = -\frac{1}{\sqrt{3}}x + 3$



$\tan\theta = -\frac{1}{\sqrt{3}}$

$\theta = 150°$

④ (3) 2直線 $y = \sqrt{3}x + 1$ と $y = -x + 5$ のなす角 (小さい方)



$\tan\alpha = \sqrt{3}$ より $\alpha = 60°$ ①

$\tan\beta = -1$ より $\beta = 135°$ ①

三角形の内角の和に注目して

$180° - 45° - 60° = 75°$

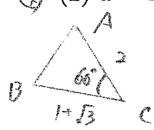
$\boxed{5}$ $\triangle ABC$ について次の値を求めよ。(17点)

④ (1) $B = 70°, C = 50°, a = 10$ のときの外接円半径 R

$\angle A = 180° - 70° - 50° = 60°$ ①　$\frac{10}{\frac{\sqrt{3}}{2}} = 2R$ ②

$\frac{10}{\sin 60°} = 2R$　　$\sqrt{3}R = 10$　　$R = \frac{10}{3}\sqrt{3}$

④ (2) $a = 1+\sqrt{3}, b = 2, C = 60°$ のときの c



$c^2 = (1+\sqrt{3})^2 + 2^2 - 2\cdot(1+\sqrt{3})\cdot2\cos60°$ ①

$= 1+2\sqrt{3}+3+4-2(1+\sqrt{3})$

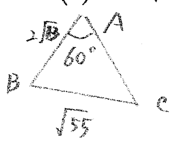
$= 1+2\sqrt{3}+3+4-2-2\sqrt{3}$

$= 6$

$c > 0$ より

$c = \sqrt{6}$

④ (3) $a = \sqrt{55}, c = 2\sqrt{13}, A = 60°$ のときの b



$55 = b^2 + (2\sqrt{13})^2 - 2\cdot2\sqrt{13}\cdot b\cos60°$

$55 = b^2 + 52 - 2\sqrt{13}b$

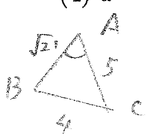
$b^2 - 2\sqrt{13}b - 3 = 0$ ②

$b = \sqrt{13} \pm \sqrt{13+3}$

$b = \sqrt{13} \pm 4$　　$b > 0$

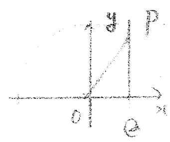
$\sqrt{13} < 4$ より　$b = \sqrt{13} + 4$

⑤ (4) $a = 4, b = 5, c = \sqrt{21}$ のとき $\sin A$

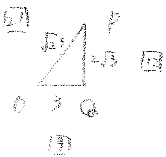


$\cos A = \frac{21+25-16}{2\cdot\sqrt{21}\cdot5}$

$= \frac{\cancel{30}\,3}{2\cdot\sqrt{21}\cdot5} = \frac{3}{\sqrt{21}}$ ②



図



図

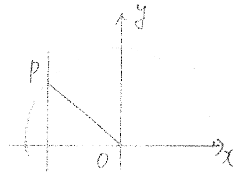
$\sin A = \frac{2\sqrt{3}}{\sqrt{21}}$　$\frac{2}{\sqrt{7}}$

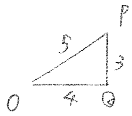
6 θ が次の条件であるとき $\sin\theta$ の値を求めよ。(~~10~~ 点) 7

(1) $\theta = 60^\circ$ (答のみ)

$\sin\theta = \frac{\sqrt{3}}{2}$

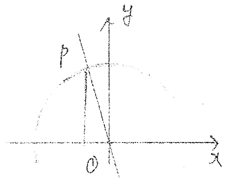
(2) $\cos\theta = -\frac{4}{5}$

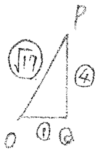




$\sin\theta = \frac{3}{5}$

(3) $\tan\theta = -4$





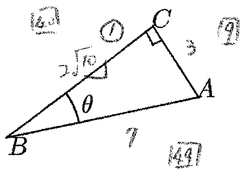
$\sin\theta = \frac{4}{\sqrt{17}}$

7 θ が次の条件であるとき $\cos\theta$ の値を求めよ。(10 点)

(1) $\theta = 45^\circ$ (答のみ)

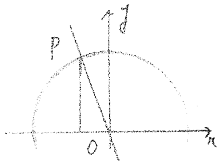
$\cos\theta = \frac{1}{\sqrt{2}}$

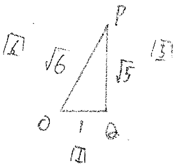
(2) $AB = 7, AC = 3$



$\cos\theta = \frac{2\sqrt{10}}{7}$

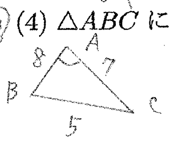
(3) $\tan\theta = -\sqrt{5}$





$\cos\theta = -\frac{1}{\sqrt{6}}$

(4) $\triangle ABC$ について $a = 5, b = 7, c = 8$ $\angle BAC = \theta$



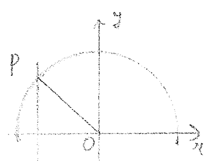
$\cos A = \frac{8^2+7^2-5^2}{2\cdot 8\cdot 7} = \frac{64+49-25}{2\cdot 8\cdot 7} = \frac{88}{2\cdot 8\cdot 7} = \frac{11}{14}$

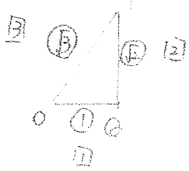
8 θ が次の条件であるとき $\tan\theta$ の値を求めよ。(7 点)

(1) $\theta = 135^\circ$ (答のみ)

$\tan\theta = -1$

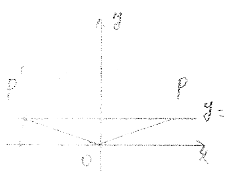
(2) $\cos\theta = -\frac{1}{\sqrt{3}}$

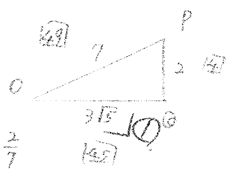




$\tan\theta = -\sqrt{2}$

(3) $\sin\theta = \frac{2}{7}$





$\tan\theta = \frac{2}{3\sqrt{5}}$

土抜け -1

9 方程式や不等式を解け。 $(0^\circ \leqq \theta \leqq 180^\circ)$(~~19~~ 点) 22

(1) $2x^2 + 4x - 7 = 0$

$x = \frac{-2\pm\sqrt{4+14}}{2}$

$x = \frac{-2\pm 3\sqrt{2}}{2}$

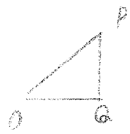
(2) $3x^2 + 4x - 4 = 0$

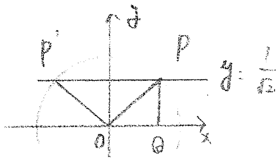
$(3x-2)(x+2)=0$

$x = \frac{2}{3}, -2$

(3) $\sin\theta = \frac{1}{\sqrt{2}}$

答のみ





$\theta = 45^\circ, 135^\circ$

(4) $2\sin^2\theta + 5\sin\theta - 3 = 0$

$(2\sin\theta - 1)(\sin\theta + 3) = 0$

$\sin\theta = \frac{1}{2}, -3$

$0 \leqq \sin\theta \leqq 1$ より

$\sin\theta = \frac{1}{2}$

$\theta = 30^\circ, 150^\circ$

(5) $4x - 7 \leqq 6x + 3$

$4x - 6x \leqq 7 + 3$

$-2x \leqq 10$

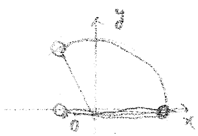
$x \geqq -5$

(6) $x^2 - 4x + 3 \geqq 0$

$(x-1)(x-3) \geqq 0$

$x \leqq 1,\ 3 \leqq x$

(7) $\cos\theta > -\frac{1}{2}$



$0 \leqq \theta < 120^\circ$

中学３年数学α２学期期末考査　４組　番氏名 解答 (15/12/07)

答えが２つある or １つしかないの判断は各自で行うこと

$\boxed{1}$ 方程式や不等式を解け。 $(0^\circ \leqq \theta \leqq 180^\circ)$(27 点)

② (1) $2x-3=5x+1$

$2x-5x=1+3$

$-3x=4$

$x=-\frac{4}{3}$

③ (2) $2x^2+4x-7=0$

$x=\frac{-2\pm\sqrt{4+14}}{2}$

$x=\frac{-2\pm3\sqrt{2}}{2}$

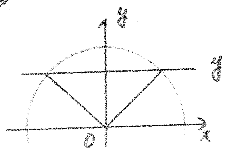
③ (3) $3x^2+4x-4=0$

$$\begin{array}{ccc} 3 & -2 & -2 \\ 1 & 2 & 6 \\ \hline 3 & -4 & 4 \end{array}$$

$(3x-2)(x+2)=0$ ①

$x=\frac{2}{3},\ -2$

③ (4) $\sin\theta=\frac{1}{\sqrt{2}}$



$\theta=45^\circ,\ 135^\circ$

片方①

④ (5) $2\sin^2\theta+5\sin\theta-3=0$

$$\begin{array}{ccc} 2 & -1 & -1 \\ 1 & 3 & 6 \\ \hline 2 & -3 & 5 \end{array}$$

$(2\sin\theta-1)(\sin\theta+3)=0$

$\sin\theta=\frac{1}{2},\ -3$ ①

$0\leqq\sin\theta\leqq1$ より

$\sin\theta=\frac{1}{2}$

片方②

$\theta=30^\circ,\ 150^\circ$

② (6) $4x-7\leqq6x+3$

$4x-6x\leqq7+3$

$-2x\leqq10$

$x\geqq-5$

③ (7) $x^2-4x+4\leqq0$

$(x-2)^2\leqq0$

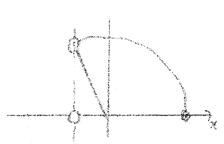
$x=2$

③ (8) $x^2-4x+3\geqq0$

$(x-1)(x-3)\geqq0$

$x\leqq1,\ 3\leqq x$

④ (9) $\cos\theta>-\frac{1}{2}$



$0\leqq\theta<120^\circ$

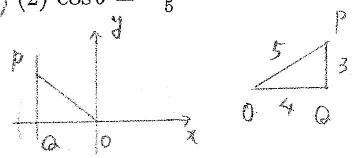
※ $\theta<120^\circ$ △3

$\boxed{2}$ θ が次の条件であるとき $\sin\theta$ の値を求めよ。(10 点)

① (1) $\theta=60^\circ$ (答のみ)

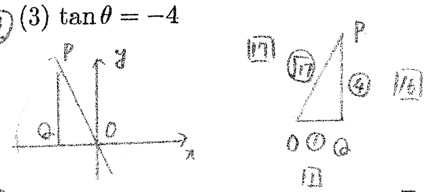
$\sin\theta=\frac{\sqrt{3}}{2}$

③ (2) $\cos\theta=-\frac{4}{5}$



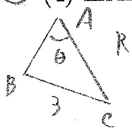
$\sin\theta=\frac{3}{5}$

③ (3) $\tan\theta=-4$



$\sin\theta=\frac{4}{\sqrt{17}}$

③ (4) $\triangle ABC$ について $a=3, R=\sqrt{5}$ $\angle BAC=\theta$



$R=\sqrt{5}$

$\frac{3}{\sin\theta}=2\sqrt{5}$

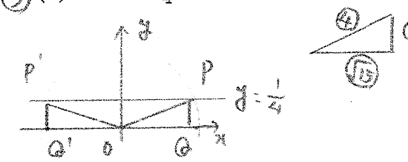
$\sin\theta=\frac{3}{2\sqrt{5}}$

$\boxed{3}$ θ が次の条件であるとき $\cos\theta$ の値を求めよ。(10 点)

① (1) $\theta=45^\circ$ (答のみ)

$\cos\theta=\frac{1}{\sqrt{2}}$

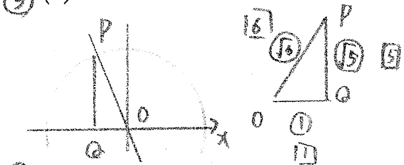
③ (2) $\sin\theta=\frac{1}{4}$



符号間違い (−2)

$\cos\theta=\pm\frac{\sqrt{15}}{4}$

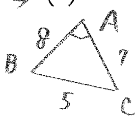
③ (3) $\tan\theta=-\sqrt{5}$



符号間違い (−2)

$\cos\theta=-\frac{1}{\sqrt{6}}$

③ (4) $\triangle ABC$ について $a=5, b=7, c=8$ $\angle BAC=\theta$



$\cos A=\frac{8^2+7^2-5^2}{2\cdot8\cdot7}$ ①

$=\frac{64+49-25}{2\cdot8\cdot7}$

$=\frac{\cancel{88}\ 11}{2\cdot8\cdot7}$

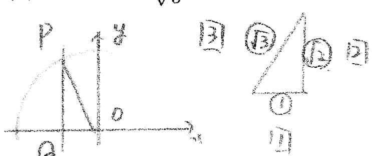
$=\frac{11}{14}$

$\boxed{4}$ θ が次の条件であるとき $\tan\theta$ の値を求めよ。(7 点)

① (1) $\theta=135^\circ$ (答のみ)

$\tan\theta=-1$

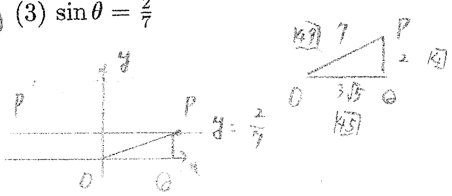
③ (2) $\cos\theta=-\frac{1}{\sqrt{3}}$



(−2) 符号間違い

$\tan\theta=-\sqrt{2}$

③ (3) $\sin\theta=\frac{2}{7}$



(−2) 符号間違い

$\tan\theta=\pm\frac{2}{3\sqrt{5}}$

5 計算せよ。(10 点)

②(1) $\frac{2x+4}{3}-\frac{7x-5}{2}$

$=\frac{1}{6}\{2(2x+4)-3(7x-5)\}$

$=\frac{1}{6}(4x+8-21x+15)$

$=\frac{1}{6}(-17x+23)$ $\quad \frac{-17x+23}{6}$

②(2) $(\sqrt{6}-\sqrt{2})^2$

$=6-2\sqrt{12}+2$

$=8-4\sqrt{3}$

②(3) $\frac{3^2+5^2-4^2}{2\times3\times5}$

$=\frac{9+25-16}{2\cdot3\cdot5}=\frac{\cancel{18}^{3}}{\cancel{2\cdot3}\cdot5}=\frac{3}{5}$

④(4) $\sin\theta+\cos\theta=\sqrt{2}$ のときの $\sin\theta\cos\theta$ の値

$\sin^2\theta+2\sin\theta\cos\theta+\cos^2\theta=2$

$1+2\sin\theta\cos\theta=2$

$2\sin\theta\cos\theta=1$

$\sin\theta\cos\theta=\frac{1}{2}$

6 次の条件を満たす三角形の形状を求めよ。(11 点)

⑤(1) $\sin A=2\cos B\sin C$

$\frac{a}{\cancel{2R}}=2\cdot\frac{a^2+c^2-b^2}{2ac}\cdot\frac{c}{\cancel{2R}}$ ②

$a^2=a^2+c^2-b^2$

$c^2-b^2=0$

$(c+b)(c-b)=0$

$c, b>0$ より $c=b$

よって $AB=AC$ の二等辺三角形

⑥(2) $a\cos A+b\cos B=c\cos C$

$a\cdot\frac{b^2+c^2-a^2}{2bc}+b\cdot\frac{a^2+c^2-b^2}{2ac}=c\cdot\frac{a^2+b^2-c^2}{2ab}$ ②

$a^2(b^2+c^2-a^2)+b^2(a^2+c^2-b^2)=c^2(a^2+b^2-c^2)$

$a^2b^2+\cancel{a^2c^2}-a^4+a^2b^2+\cancel{b^2c^2}-b^4=\cancel{a^2c^2}+\cancel{b^2c^2}-c^4$

$a^4-2a^2b^2+b^4=c^4$ ②

$(a^2-b^2)^2-c^4=0$

$(a^2-b^2+c^2)(a^2-b^2-c^2)=0$

$b^2=a^2+c^2$ または $a^2=b^2+c^2$

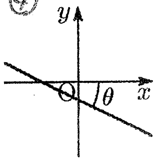
$\angle B=90°$ または $\angle A=90°$ の直角三角形

7 次の角度を求めなさい。(12 点)

③(1) 正十二角形の 1 つの内角 (答のみ)

$\frac{(12-2)\times180}{12}=150°$ $\quad 150°$

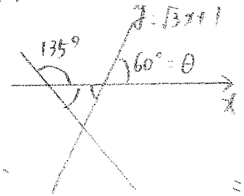
④(2) 直線 $y=-\frac{1}{\sqrt{3}}x-6$ (答のみ)



大きい方の角度は150°より

$\theta=30°$

⑤(3)2 直線 $y=\sqrt{3}x+1$ と $y=-x+5$ のなす角 (小さい方)



$\tan\theta=\sqrt{3}$ より $\theta=60°$

$\tan\alpha=-1$ より $\alpha=135°$

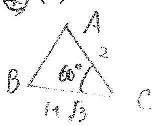
三角形の内角の和に注目して

$180-45°-60°=75°$

説明不足(−2)

8 $\triangle ABC$ について次の値を求めよ。(13 点)

④(1) $a=1+\sqrt{3}, b=2, C=60°$ のときの c



$c^2=(1+\sqrt{3})^2+2^2-2\cdot(1+\sqrt{3})\cdot2\cdot\cos60°$ ①

$=1+2\sqrt{3}+3+4-2(1+\sqrt{3})$

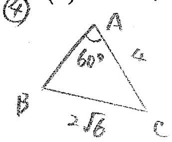
$=1+\cancel{2\sqrt{3}}+3+4-2-\cancel{2\sqrt{3}}$

$=6$

$c>0$ より

$c=\sqrt{6}$

④(2) $a=2\sqrt{6}, b=4, A=60°$ のときの c



$(2\sqrt{6})^2=4^2+c^2-2\cdot4\cdot c\cdot\cos60°$

$24=16+c^2-4c$

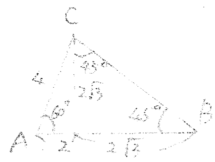
$c^2-4c-8=0$ ②

$c=2\pm\sqrt{4+8}$

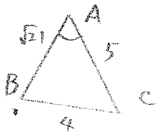
$=2\pm2\sqrt{3}$ ③

$c>0$ より

$c=2+2\sqrt{3}$

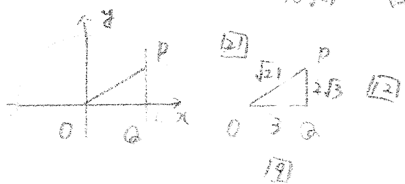


⑤(3) $a=4, b=5, c=\sqrt{21}$ のとき $\sin A$



$\cos A=\frac{21+25-16}{2\cdot\sqrt{21}\cdot5}$

$=\frac{30^3}{10\sqrt{21}}=\frac{3}{\sqrt{21}}$ ②



$\sin A=\frac{2\sqrt{3}}{\sqrt{21}}$

$=\frac{2}{\sqrt{7}}$ 未約分(−1)