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Round 1

Part 1 Best occurs at vertex $h = \frac{-b}{2a} = \frac{-2}{2(-.05)} = 20$ $\quad A = 20$

Part 2 $P = \frac{2\pi}{1} = 2\pi \quad PS = -\frac{C}{B} = -\frac{3\pi}{5} \quad 2\pi - \frac{3\pi}{5} = \frac{7\pi}{5}$ $\quad B = 5$

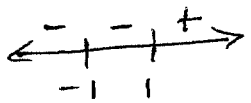
Part 3 $f(x) = \frac{(x+3)(x-3)}{(x+4)(x+3)}$ only one VA @ $x = -4$ $\quad C = -4$

Final $\frac{A}{B} + C \quad \frac{20}{5} - 4 = \boxed{0}$

Round 2

Part 1 $x^2(x+1) - 1(x+1) > 0$

$(x+1)^2(x-1) > 0$



$(1, \infty)$ $\quad A = 1$

Part 2 pattern is arithmetic $d = 9.8$

$a_6 = a_1 + (n-1)d = 4.9 + (6-1)(9.8) = 53.9 = B$

Part 3 $\begin{vmatrix} -3 & 2 \\ 1 & 5 \end{vmatrix} = -15 - 2 = -17$

$-3\begin{vmatrix} 1 & 1 & 2 \\ 0 & 2 & 3 \\ 3 & 4 & 2 \end{vmatrix} = -3(2)\begin{vmatrix} -1 & 2 \\ 3 & 2 \end{vmatrix} - 3(-3)\begin{vmatrix} -1 & 1 \\ 3 & 4 \end{vmatrix}$

$-6(-2-6) + 9(4-3)$

$= -15$

$C = -32 = -17 - 15$

Final: $A + B + C \quad 1 + 53.9 - 32 = \boxed{22.9}$

Round 3

Part 1 $\frac{5(5+h) - (5+h)^2 - (25-25)}{h} = \frac{25 + 5h - 25 - 10h - h^2}{h} =$

$\frac{-5h - h^2}{h} = -5 - h \quad A = -5$

Part 2 $a(-1)^2 + b(-1) + c = 5$

$a(2)^2 + b(2) + c = -1$

$a(0)^2 + b(0) + c = 1 \Rightarrow c = 1$

$2(a - b - 1 = 5)$

$4a + 2b - 1 = -1$

$6a - 3 = 9$

$a = 2$

$2 - b - 1 = 5$

$b = -4$

Eq. $2x^2 - 4x - 1 = 0$

$B = 2 - 4 - 1 = -3 = B$

Part 3 Test values $f(3) = -13 \quad f(4) = +42 \Rightarrow$ between 3 and 4

$C = 12$

Final: $|A| + |B| - C = 5 + 3 - 12 = \boxed{-4}$

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Round 4

Part 1 $2^3(2^{3x+1}) = 2^{2(3-x)}(2^{4x})$

$3x+4 = 6+2x$

$x = 2$

$A = 2$

Part 2 $B = 20$

$\log_4(x+12) + \log_4(x-12) = 4$

$\log_4(x^2-144) = 4$

$x^2 = 256+144 = 400$

$x = 20$

Part 3

$\cos x(\cos x + \sin x \tan x = 2)$

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

$1 = 2\cos x$

$\cos x = 1/2$ @ $\pi/3, 5\pi/3$

$C = 5\pi/3$

Final: $12C\left(\frac{A}{B\pi}\right)$

$\frac{60\pi}{3}\left(\frac{2}{20\pi}\right) = \boxed{2}$

Round 5

Part 1 $t^2 \Rightarrow t^{8-r} \Rightarrow r = 6$

${}_8C_6\, t^{8-6}(-p)^6$

${}_8C_2 = \frac{8\cdot 7}{2!} = 28$

$A = 28$

Part 2 ${}_{14}P_3 = 14\cdot 13\cdot 12 = 2184$

$B = 2184$

Part 3

$\frac{\text{Sum of } 5}{5} = 68$ $\text{Sum}_5 = 340$

$\frac{\text{Sum of } 3}{3} = 72$ $\text{Sum}_3 = 216$

$\text{Sum}_2 = 124$

$\text{AVG}_2 = 62$

$C = 62$

Final $\frac{B}{A} - C = \frac{2184}{28} - 62$

$78 - 62 = \boxed{16}$

Round 6

Part 1 $\left(x^{-1/2}\right)^{-2} = \left(\frac{1}{\sqrt{3}}\right)^{-2}$ $x = (\sqrt{3})^2 = 3$ $A = 3$

Part 2 $x^2+10x+25+y^2+4y+4 = -17+25+4$ $B = 3$

$(x+5)^2 + (y+2)^2 = 12$ $C = (5,-2)$ $r = 2\sqrt{3}$

Part 3 $P = \frac{2\pi}{B}$ $\frac{2\pi}{3} = \frac{2\pi}{B} \Rightarrow B = 3$ $y = 3\sin 3x$

$C = 6$

Final $B^A - C$ $3^3 - 6 = 27 - 6 = \boxed{21}$

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Round 7

Part 1

$0 = -25(t-2)^2 + 100$

$-100 = -25(t-2)^2$

$4 = (t-2)^2$

$\pm 2 = t - 2$

$t = 0$ or 4 sec.

$\underline{A = 4}$

Part 2

$S = 2500 + \sqrt{4{,}000{,}000}$

$= 4500$

$r(x) = 1000 + \sqrt{20(4500)}$

$= 1000 + 300 = 1300$

$\underline{B = 1300}$

Part 3

$-3 = \frac{x+5}{x-5}$

$-3x + 15 = x + 5$

$-4x = -10$

$x = \frac{5}{2}$

$\underline{C = \frac{5}{2}}$

Final: $\frac{B}{A(C)} = \frac{1300}{4(5/2)} = \boxed{130}$

Round 8

Part 1

$\sin^2 20° + \cos^2 20° + \frac{1 - \sin^2 40°}{\cos^2 40°} = 1 + 1 = 2$ ($\sin^2 20° + \cos^2 20° = 1$; $1 - \sin^2 40° = \cos^2 40°$)

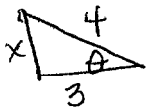
$\underline{A = 2}$

Part 2

$\cos\theta = -3/4$

$\sin\theta = -\frac{\sqrt{7}}{4}$

θ in QIII



$x^2 + 3^2 = 4^2$

$x^2 = 16 - 9$

$x = \pm\sqrt{7}$

$\underline{B = \frac{-\sqrt{7}}{4}}$

Part 3

$(\sin\theta + \cos\theta)^2 = (1.2)^2$

$\sin^2\theta + 2\cos\theta\sin\theta + \cos^2\theta = 1.44$

$1 + \sin 2\theta = 1.44$ ($2\sin\theta\cos\theta = \sin 2\theta$)

$\sin 2\theta = 0.44$

$\underline{C = 0.44}$

Final

$25C - B^{-A}$

$25\left(\frac{44}{100}\right) - \left(-\frac{\sqrt{7}}{4}\right)^{-2} = 11 - \frac{16}{7} = \frac{77-16}{7} = \boxed{\frac{61}{7}}$

Round 9

Part 1

$-1(x + y = 2)$

$x + y^2 = 4$

$y^2 - y = 2$

$y^2 - y - 2 = 0$

$(y-2)(y+1) = 0$

$y = 2$ or $y = -1$

$x - 1 = 2$ $\quad x + 2 = 2$

$x = 3$ $\quad x = 0$

$(3, -1)$; $(0, 2)$

$A = 3 - 1 + 0 + 2 = 4$

$\underline{A = 4}$

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Round 9

Part 2

$6 \cdot 6 = 36$ ways to roll 2 die

6 5 4 3 2 1
5 4 3 2 1
4 3 2 1
3 2 1
2 1

} 15 ways red > blue $\frac{15}{36} = \frac{5}{12}$

$B = 12 - 5 =$

$\underline{B = 7}$

Part 3

$f(2x+5) - g(3x+1)$

$3(2x+5)+1 - (2(3x+1)+5)$

$6x + 15 + 1 - 6x - 2 - 5 = 9$

$\underline{C = 9}$

Final

$6A - 4B + C$

$6(4) - 4(7) + 9$

$24 - 28 + 9 = \boxed{5}$

Round 10

Part 1 $x^4 + bx^3 + 3x^2 + ax^3 + abx^2 + 3ax + 2x^2 + 26x + 6$

$17x^2 = x^2(3 + 2 + ab)$

$17 = 5 + ab$

$12 = ab$

$\underline{A = 12}$

Part 2 $x + 6 - (4x + 6) = 4x - 2 - (x + 6)$

$-3x = 3x - 8$

$-6x = -8$

$x = 4/3$

$\underline{B = \frac{4}{3}}$

Part 3

$\begin{bmatrix} 3 & 2 \\ -1 & 4 \end{bmatrix}\begin{bmatrix} 6 & 1 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} 22 & 9 \\ 2 & 11 \end{bmatrix}\begin{bmatrix} 2 \\ -1 \end{bmatrix} = \begin{bmatrix} 44-9 \\ 4-11 \end{bmatrix} = \begin{bmatrix} 35 \\ -7 \end{bmatrix}$

$35+7$

$\underline{C = 42}$

Final $C - AB$

$42 - 12\left(\frac{4}{3}\right) = 42 - 16 = \boxed{26}$