

رشته تجربی

تحلیل آزمون قلم چی

۵ آذر ۱۴۰۰



آکادمی اصلانی



 riaz_i_aslani

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۹۲- کدامیک از موارد زیر از سایر گزینه‌ها کوچک‌تر است؟

~~Sin 1 (۱)~~

۳۳ ۵۷

Sin 2 (۲)

۱۱۴

Sin 7 (۳)

۴
۵۷
۳۹۹
۲۴۰
۲۹

Sin 8 (۴)

۵
۵۷
۴۵۶



۹۳- اگر $\cot 15^\circ = a$ باشد، آنگاه حاصل $\frac{2 \sin 105^\circ + \cos 255^\circ}{\sin 345^\circ + 3 \sin 525^\circ}$ کدام است؟

$$\frac{2a+1}{2} \quad (4)$$

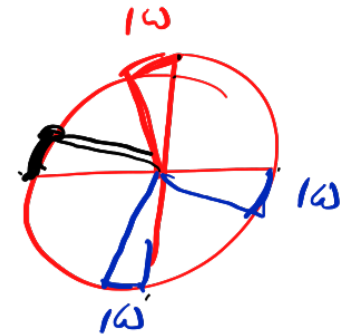
$$\frac{2-a}{1-3a} \quad (3)$$

$$\frac{a-2}{1+3a} \quad (2)$$

$$\frac{2a-1}{2} \quad (1) \quad \begin{matrix} \text{Cot} \rightarrow a \\ \text{Sin} \rightarrow 1 \end{matrix}$$

$$\frac{2 \cos 15^\circ - \sin 15^\circ}{-\sin 15^\circ + 3 \sin 15^\circ} = \frac{2a-1}{2}$$

$$\omega \text{ t.o. } \rightarrow 2 \times a$$



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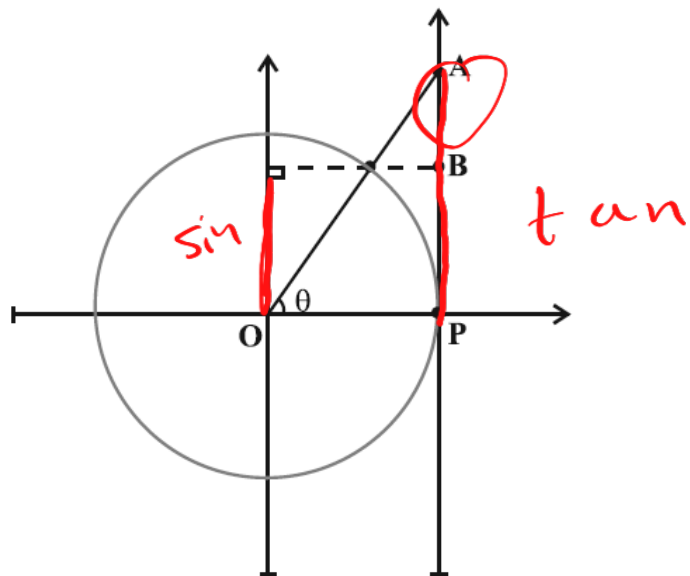
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۹۴- در دایرهٔ مثلثاتی مقابل، طول پاره خط AB کدام است؟



(۱) $\frac{1}{\sin \theta}$

(۲) $\frac{1}{\cos \theta}$

(۳) $\tan \theta - \sin \theta$

(۴) $\tan \theta - 1$



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۹۵- اگر $\frac{\sin x}{1 + \cos x} + \frac{1 + \cos x}{\sin x} = 3$ و x در ربع دوم دایرهٔ مثلثاتی باشد، حاصل $\tan x$ کدام است؟

$\frac{-3}{2}$ (۴)

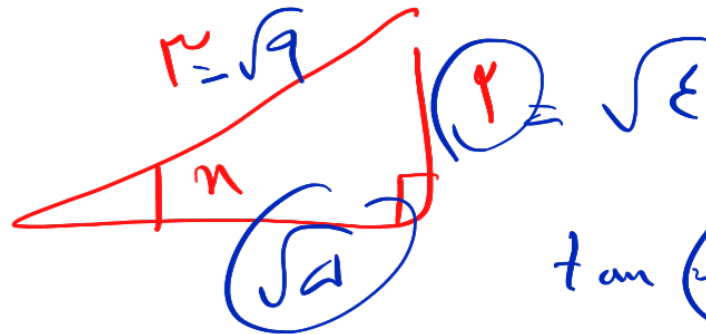
$\frac{-2}{3}$ (۳)

$\frac{-3}{\sqrt{5}}$ (۲)

$\frac{-2}{\sqrt{5}}$ (۱) ✓

$$\frac{1 - \cancel{\sin x}}{\sin x} + \frac{1 + \cancel{\sin x}}{\sin x} = \frac{2}{\sin x} = 3$$

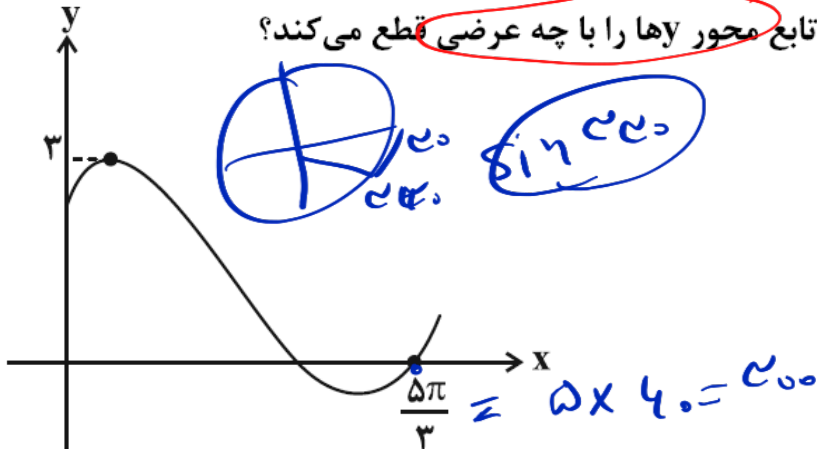
$$\sin x = \frac{2}{3}$$



$$\tan x = -\frac{2}{\sqrt{5}}$$



۹۷- بخشی از نمودار تابع $y = a + b \sin(x + \frac{\pi}{\phi})$ به صورت مقابل است. این تابع محور y ها را با چه عرضی قطع می کند؟



$$\begin{cases} -a + b = 3 \\ a - \frac{1}{4}b = 0 \end{cases}$$

$$\frac{5}{4}b = 3$$

$$b = 2$$

$$a = 1$$

$$y = 1 + 2 \sin(x + \frac{\pi}{4})$$

$$1 + 2 \times \frac{1}{2} = 2$$

۱/۵ (۱)

۲ (۲)

۲/۲۵ (۳)

۲/۵ (۴)



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۹۸- تابع f با ضابطه $f(x) = 3 \cot(2\pi x + \frac{3\pi}{2}) + 1$ در کدام یک از بازه‌های زیر اکیداً صعودی است؟

~~$(-\frac{1}{2}, 0)$~~

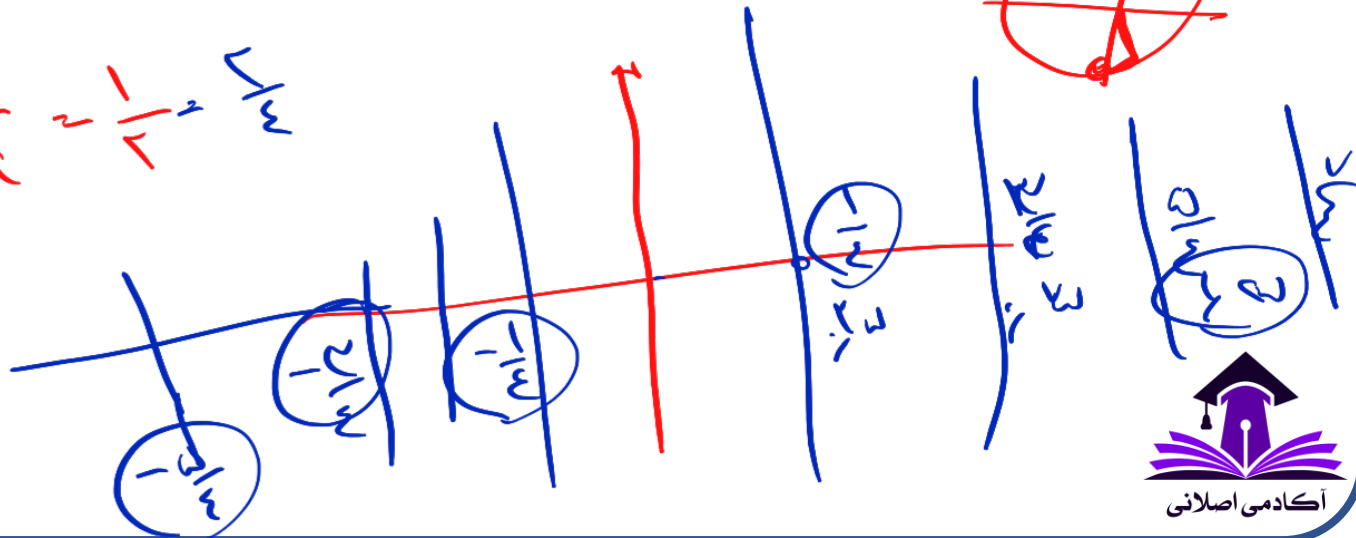
~~$(\frac{1}{2}, \frac{3}{2})$~~

~~$(\frac{5}{4}, \frac{7}{4})$~~

~~$(\frac{1}{2}, \frac{5}{4})$~~

$3 \tan(2\pi x) + 1$

$T = \frac{\pi}{2\pi} = \frac{1}{2} = \frac{\sqrt{2}}{2}$



۱۰۱- چه تعداد از مجموعه‌های زیر متناهی هستند؟

$B = \{x \mid x \in A, \sqrt{-x} > 4\}$ (ب)

$A = \{x \mid x \in \mathbb{Z}, x^2 \geq 100\}$ (الف)

$D = \{x \mid x \in \mathbb{C}, \frac{x}{5} \in \mathbb{Z}\}$ (ت)

$C = \{x \mid x \in B, \frac{72}{x} \in \mathbb{Z}\}$ (پ)

۳ (۴)

۲ (۳)

۱ (۲)

صفر (۱)



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آکادمی اصلانی

۱۰۲- در یک کلاس ۴۵ نفری تعداد کسانی که اقوامشان قبلاً به کرونا مبتلا شده‌اند $\frac{1}{5}$ برابر کسانی است که خودشان به کرونا مبتلا شده‌اند. اگر تعداد کسانی که فقط خودشان به کرونا مبتلا شده‌اند، ۱۰ نفر باشد و تعداد کسانی که نه خودشان و نه اقوامشان به کرونا مبتلا شده‌اند، ۵ نفر باشد، تعداد کسانی که حداکثر خود یا اقوامشان به کرونا مبتلا شده است، کدام است؟

۴۰ (۴)

۳۵ (۳)

۳۰ (۲)

۲۵ (۱)

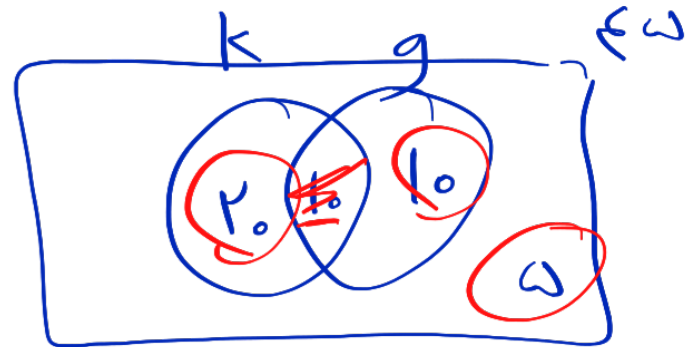
$$K = 1, \omega, g$$

$$K \cup g = \omega$$

$$\omega = 1, \omega (1 + n)$$

$$\omega = 1, \omega + 1, \omega n$$

$$1, \omega = 1, \omega n \rightarrow n \leq 1$$



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۱۰۳- مجموع ۱۰۱ جمله اول دنباله $a_{n+1} = -a_n + (-1)^n$ با فرض $a_1 = 3$ کدام است؟
 ۵۱ (۲) ۵۲ (۳) ۵۳ (۴) ۵۴ (۱)

$$a_1 = 3$$

$$a_2 = -3 + (-1)^1 = -4$$

$$a_3 = -4 + (-1)^2 = -3$$

$$\frac{103}{2} = 51.5$$

۵۱.۵



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آکادمی اصلائی

۱۰۵- اگر $x - \frac{1}{x} = -1$ باشد، حاصل $\frac{x^4 + 1x^2 + 4}{x^2 - x + 2}$ چقدر است؟

۸ (۱)

۶ (۴)

۳ (۳)

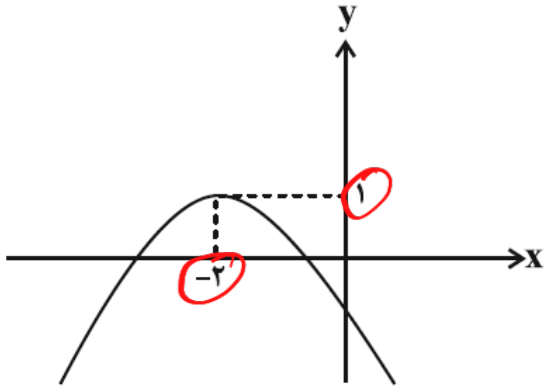
$$n^c - 1 = -n$$

$$n^c + n \geq 1$$

$$(n^c + 1)^c - n^c \rightarrow \frac{(n^c + 1 - n)(n^c + 1 + n)}{n^c - n + 1}$$

$$\frac{n^c + 1 + n}{n^c - n + 1}$$

۱۰۹- نمودار سهمی $f(x) = -\frac{1}{2}x^2 + ax + b$ به صورت زیر است. قدر مطلق تفاضل صفرهای این سهمی کدام است؟



$$x_2 = \frac{a}{-1} = -2 \quad \text{or} \quad a_2 = 2$$

(۱) $\sqrt{2}$

(۲) $2\sqrt{2}$ ✓

(۳) ۱

(۴) ۲

$$b + \frac{1}{2}(2)^2 = 1$$

$$b + 2 = 1 \quad \text{or} \quad b = -1$$

$$= 2\sqrt{2}$$

$$f(x) = -\frac{1}{2}x^2 - 2x - 1$$

$$d = \frac{\sqrt{\Delta}}{|a|} = \frac{\sqrt{4 - 4(\frac{1}{2})(1)}}{1} = \frac{\sqrt{2}}{1} = \sqrt{2}$$



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آکادمی اصلانی

۱۱۱- اگر بین ریشه‌های x_2, x_1 از معادله $x^2 - 3x - 2m + 1 = 0$ رابطه $2x_1 - 3x_2 = 6$ برقرار باشد، کدام m است؟

$$-\frac{1}{2} \quad (4)$$

$$1 \quad (3)$$

$$2 \quad \text{صفر}$$

$$\frac{1}{2} \quad (1) \quad \checkmark$$

$$\left\{ \begin{array}{l} 2x_1 - 3x_2 = 6 \\ 2x_1 + 3x_2 = 9 \end{array} \right.$$

$$2x_1 + 3x_2 = 9$$

$$2x_1 = 2 \quad | :2$$

$$x_1 = 1$$

$$x^2 - 3x - 2m + 1 = 0$$

$$m = \frac{1}{2}$$

۱۱۲- معادله $x^4 - (m^2 - 1)x^2 + 3 - 4m = 0$ ، چهار ریشه حقیقی دارد که مجموع مربعات آنها برابر ۳۰ است. چند مقدار برای m وجود دارد؟

دارد؟

(۱) صفر

Handwritten solution:

$$x^4 - (m^2 - 1)x^2 + 3 - 4m = 0$$

Let $u = x^2$, then the equation becomes a quadratic in u :

$$u^2 - (m^2 - 1)u + 3 - 4m = 0$$

The discriminant Δ must be non-negative for real roots:

$$\Delta = (m^2 - 1)^2 - 4(3 - 4m) \geq 0$$

$$m^4 - 2m^2 + 1 - 12 + 16m \geq 0$$

$$m^4 - 2m^2 + 16m - 11 \geq 0$$

Factoring the polynomial:

$$(m - 1)(m^3 + m^2 + 14m - 11) \geq 0$$

Testing $m = 1$:

$$1^4 - 2(1)^2 + 16(1) - 11 = 1 - 2 + 16 - 11 = 4 \geq 0$$

Testing $m = 2$:

$$2^4 - 2(2)^2 + 16(2) - 11 = 16 - 8 + 32 - 11 = 29 \geq 0$$

Testing $m = 3$:

$$3^4 - 2(3)^2 + 16(3) - 11 = 81 - 18 + 48 - 11 = 100 \geq 0$$

Testing $m = 4$:

$$4^4 - 2(4)^2 + 16(4) - 11 = 256 - 32 + 64 - 11 = 277 \geq 0$$

Testing $m = 5$:

$$5^4 - 2(5)^2 + 16(5) - 11 = 625 - 50 + 80 - 11 = 644 \geq 0$$

Testing $m = 6$:

$$6^4 - 2(6)^2 + 16(6) - 11 = 1296 - 72 + 96 - 11 = 1309 \geq 0$$

Testing $m = 7$:

$$7^4 - 2(7)^2 + 16(7) - 11 = 2401 - 98 + 112 - 11 = 2304 \geq 0$$

Testing $m = 8$:

$$8^4 - 2(8)^2 + 16(8) - 11 = 4096 - 128 + 128 - 11 = 4085 \geq 0$$

Testing $m = 9$:

$$9^4 - 2(9)^2 + 16(9) - 11 = 6561 - 162 + 144 - 11 = 6432 \geq 0$$

Testing $m = 10$:

$$10^4 - 2(10)^2 + 16(10) - 11 = 10000 - 200 + 160 - 11 = 9949 \geq 0$$

Testing $m = 11$:

$$11^4 - 2(11)^2 + 16(11) - 11 = 14641 - 242 + 176 - 11 = 14564 \geq 0$$

Testing $m = 12$:

$$12^4 - 2(12)^2 + 16(12) - 11 = 20736 - 288 + 192 - 11 = 20629 \geq 0$$

Testing $m = 13$:

$$13^4 - 2(13)^2 + 16(13) - 11 = 28561 - 338 + 208 - 11 = 28420 \geq 0$$

Testing $m = 14$:

$$14^4 - 2(14)^2 + 16(14) - 11 = 38416 - 392 + 224 - 11 = 38239 \geq 0$$

Testing $m = 15$:

$$15^4 - 2(15)^2 + 16(15) - 11 = 50625 - 450 + 240 - 11 = 50404 \geq 0$$

Testing $m = 16$:

$$16^4 - 2(16)^2 + 16(16) - 11 = 65536 - 512 + 256 - 11 = 65269 \geq 0$$

Testing $m = 17$:

$$17^4 - 2(17)^2 + 16(17) - 11 = 83521 - 578 + 272 - 11 = 82992 \geq 0$$

Testing $m = 18$:

$$18^4 - 2(18)^2 + 16(18) - 11 = 104976 - 648 + 288 - 11 = 104365 \geq 0$$

Testing $m = 19$:

$$19^4 - 2(19)^2 + 16(19) - 11 = 130321 - 722 + 304 - 11 = 129892 \geq 0$$

Testing $m = 20$:

$$20^4 - 2(20)^2 + 16(20) - 11 = 160000 - 800 + 320 - 11 = 159509 \geq 0$$

Testing $m = 21$:

$$21^4 - 2(21)^2 + 16(21) - 11 = 194481 - 882 + 336 - 11 = 193724 \geq 0$$

Testing $m = 22$:

$$22^4 - 2(22)^2 + 16(22) - 11 = 234256 - 968 + 352 - 11 = 233529 \geq 0$$

Testing $m = 23$:

$$23^4 - 2(23)^2 + 16(23) - 11 = 279841 - 1058 + 368 - 11 = 278940 \geq 0$$

Testing $m = 24$:

$$24^4 - 2(24)^2 + 16(24) - 11 = 331776 - 1152 + 384 - 11 = 330897 \geq 0$$

Testing $m = 25$:

$$25^4 - 2(25)^2 + 16(25) - 11 = 390625 - 1250 + 400 - 11 = 389764 \geq 0$$

Testing $m = 26$:

$$26^4 - 2(26)^2 + 16(26) - 11 = 456976 - 1352 + 416 - 11 = 455929 \geq 0$$

Testing $m = 27$:

$$27^4 - 2(27)^2 + 16(27) - 11 = 531441 - 1458 + 432 - 11 = 529963 \geq 0$$

Testing $m = 28$:

$$28^4 - 2(28)^2 + 16(28) - 11 = 614656 - 1568 + 448 - 11 = 613415 \geq 0$$

Testing $m = 29$:

$$29^4 - 2(29)^2 + 16(29) - 11 = 707281 - 1682 + 464 - 11 = 705952 \geq 0$$

Testing $m = 30$:

$$30^4 - 2(30)^2 + 16(30) - 11 = 810000 - 1800 + 480 - 11 = 808669 \geq 0$$

Testing $m = 31$:

$$31^4 - 2(31)^2 + 16(31) - 11 = 923681 - 1922 + 496 - 11 = 921844 \geq 0$$

Testing $m = 32$:

$$32^4 - 2(32)^2 + 16(32) - 11 = 1048576 - 2048 + 512 - 11 = 1046529 \geq 0$$

Testing $m = 33$:

$$33^4 - 2(33)^2 + 16(33) - 11 = 1188081 - 2178 + 528 - 11 = 1186310 \geq 0$$

Testing $m = 34$:

$$34^4 - 2(34)^2 + 16(34) - 11 = 1344896 - 2312 + 544 - 11 = 1342517 \geq 0$$

Testing $m = 35$:

$$35^4 - 2(35)^2 + 16(35) - 11 = 1518061 - 2450 + 560 - 11 = 1515660 \geq 0$$

Testing $m = 36$:

$$36^4 - 2(36)^2 + 16(36) - 11 = 1699456 - 2592 + 576 - 11 = 1696829 \geq 0$$

Testing $m = 37$:

$$37^4 - 2(37)^2 + 16(37) - 11 = 1898081 - 2738 + 592 - 11 = 1895722 \geq 0$$

Testing $m = 38$:

$$38^4 - 2(38)^2 + 16(38) - 11 = 2114016 - 2888 + 608 - 11 = 2111515 \geq 0$$

Testing $m = 39$:

$$39^4 - 2(39)^2 + 16(39) - 11 = 2347361 - 3038 + 624 - 11 = 2344336 \geq 0$$

Testing $m = 40$:

$$40^4 - 2(40)^2 + 16(40) - 11 = 2608000 - 3192 + 640 - 11 = 2605337 \geq 0$$

Testing $m = 41$:

$$41^4 - 2(41)^2 + 16(41) - 11 = 2894881 - 3358 + 656 - 11 = 2891968 \geq 0$$

Testing $m = 42$:

$$42^4 - 2(42)^2 + 16(42) - 11 = 3206416 - 3528 + 672 - 11 = 3203449 \geq 0$$

Testing $m = 43$:

$$43^4 - 2(43)^2 + 16(43) - 11 = 3542881 - 3698 + 688 - 11 = 3539760 \geq 0$$

Testing $m = 44$:

$$44^4 - 2(44)^2 + 16(44) - 11 = 3904000 - 3868 + 704 - 11 = 3899821 \geq 0$$

Testing $m = 45$:

$$45^4 - 2(45)^2 + 16(45) - 11 = 4290025 - 4038 + 720 - 11 = 4286696 \geq 0$$

Testing $m = 46$:

$$46^4 - 2(46)^2 + 16(46) - 11 = 4700800 - 4208 + 736 - 11 = 4697317 \geq 0$$

Testing $m = 47$:

$$47^4 - 2(47)^2 + 16(47) - 11 = 5136321 - 4378 + 752 - 11 = 5132662 \geq 0$$

Testing $m = 48$:

$$48^4 - 2(48)^2 + 16(48) - 11 = 5596800 - 4548 + 768 - 11 = 5592909 \geq 0$$

Testing $m = 49$:

$$49^4 - 2(49)^2 + 16(49) - 11 = 6082369 - 4718 + 784 - 11 = 6078320 \geq 0$$

Testing $m = 50$:

$$50^4 - 2(50)^2 + 16(50) - 11 = 6593000 - 4888 + 800 - 11 = 6588701 \geq 0$$

Testing $m = 51$:

$$51^4 - 2(51)^2 + 16(51) - 11 = 7128721 - 5058 + 816 - 11 = 7123468 \geq 0$$

Testing $m = 52$:

$$52^4 - 2(52)^2 + 16(52) - 11 = 7689440 - 5228 + 832 - 11 = 7684031 \geq 0$$

Testing $m = 53$:

$$53^4 - 2(53)^2 + 16(53) - 11 = 8275169 - 5398 + 848 - 11 = 8269508 \geq 0$$

Testing $m = 54$:

$$54^4 - 2(54)^2 + 16(54) - 11 = 8886000 - 5568 + 864 - 11 = 8880281 \geq 0$$

Testing $m = 55$:

$$55^4 - 2(55)^2 + 16(55) - 11 = 9522025 - 5738 + 880 - 11 = 9516156 \geq 0$$

Testing $m = 56$:

$$56^4 - 2(56)^2 + 16(56) - 11 = 10183216 - 5908 + 896 - 11 = 10177193 \geq 0$$

Testing $m = 57$:

$$57^4 - 2(57)^2 + 16(57) - 11 = 10869569 - 6078 + 912 - 11 = 10863491 \geq 0$$

Testing $m = 58$:

$$58^4 - 2(58)^2 + 16(58) - 11 = 11581000 - 6248 + 928 - 11 = 11574669 \geq 0$$

Testing $m = 59$:

$$59^4 - 2(59)^2 + 16(59) - 11 = 12317521 - 6418 + 944 - 11 = 12310036 \geq 0$$

Testing $m = 60$:

$$60^4 - 2(60)^2 + 16(60) - 11 = 13089000 - 6588 + 960 - 11 = 13082351 \geq 0$$

Testing $m = 61$:

$$61^4 - 2(61)^2 + 16(61) - 11 = 13895521 - 6758 + 976 - 11 = 13888629 \geq 0$$

Testing $m = 62$:

$$62^4 - 2(62)^2 + 16(62) - 11 = 14737000 - 6928 + 992 - 11 = 14730051 \geq 0$$

Testing $m = 63$:

$$63^4 - 2(63)^2 + 16(63) - 11 = 15613521 - 7098 + 1008 - 11 = 15606310 \geq 0$$

Testing $m = 64$:

$$64^4 - 2(64)^2 + 16(64) - 11 = 16525000 - 7268 + 1024 - 11 = 16517641 \geq 0$$

Testing $m = 65$:

$$65^4 - 2(65)^2 + 16(65) - 11 = 17471521 - 7438 + 1040 - 11 = 17464012 \geq 0$$

Testing $m = 66$:

$$66^4 - 2(66)^2 + 16(66) - 11 = 18453000 - 7608 + 1056 - 11 = 18445327 \geq 0$$

Testing $m = 67$:

$$67^4 - 2(67)^2 + 16(67) - 11 = 19469521 - 7778 + 1072 - 11 = 19461703 \geq 0$$

Testing $m = 68$:

$$68^4 - 2(68)^2 + 16(68) - 11 = 20521000 - 7948 + 1088 - 11 = 20513029 \geq 0$$

Testing $m = 69$:

$$69^4 - 2(69)^2 + 16(69) - 11 = 21607521 - 8118 + 1104 - 11 = 21600396 \geq 0$$

Testing $m = 70$:

$$70^4 - 2(70)^2 + 16(70) - 11 = 22729000 - 8288 + 1120 - 11 = 22719601 \geq 0$$

Testing $m = 71$:

$$71^4 - 2(71)^2 + 16(71) - 11 = 23885521 - 8458 + 1136 - 11 = 23876989 \geq 0$$

Testing $m = 72$:

$$72^4 - 2(72)^2 + 16(72) - 11 = 25077000 - 8628 + 1152 - 11 = 25069311 \geq 0$$

Testing $m = 73$:

$$73^4 - 2(73)^2 + 16(73) - 11 = 26303521 - 8798 + 1168 - 11 = 26295670 \geq 0$$

Testing $m = 74$:

$$74^4 - 2(74)^2 + 16(74) - 11 = 27565000 - 8968 + 1184 - 11 = 27556021 \geq 0$$

Testing $m = 75$:

$$75^4 - 2(75)^2 + 16(75) - 11 = 28861521 - 9138 + 1200 - 11 = 28852572 \geq 0$$

Testing $m = 76$:

$$76^4 - 2(76)^2 + 16(76) - 11 = 30193000 - 9308 + 1216 - 11 = 30182697 \geq 0$$

Testing $m = 77$:

$$77^4 - 2(77)^2 + 16(77) - 11 = 31559521 - 9478 + 1232 - 11 = 31550263 \geq 0$$

Testing $m = 78$:

$$78^4 - 2(78)^2 + 16(78) - 11 = 32961000 - 9648 + 1248 - 11 = 32952389 \geq 0$$

Testing $m = 79$:

$$79^4 - 2(79)^2 + 16(79) - 11 = 34397521 - 9818 + 1264 - 11 = 34387956 \geq 0$$

Testing $m = 80$:

$$80^4 - 2(80)^2 + 16(80) - 11 = 35869000 - 9988 + 1280 - 11 = 35859281 \geq 0$$

Testing $m = 81$:

$$81^4 - 2(81)^2 + 16(81) - 11 = 37375521 - 10158 + 1296 - 11 = 37366449 \geq 0$$

Testing $m = 82$:

$$82^4 - 2(82)^2 + 16(82) - 11 = 38917000 - 10328 + 1312 - 11 = 38907671 \geq 0$$

Testing $m = 83$:

$$83^4 - 2(83)^2 + 16(83) - 11 = 40493521 - 10498 + 1328 - 11 = 40483340 \geq 0$$

Testing $m = 84$:

$$84^4 - 2(84)^2 + 16(84) - 11 = 42105000 - 10668 + 1344 - 11 = 42094661 \geq 0$$

Testing $m = 85$:

$$85^4 - 2(85)^2 + 16(85) - 11 = 43751521 - 10838 + 1360 - 11 = 43740632 \geq 0$$

Testing $m = 86$:

$$86^4 - 2(86)^2 + 16(86) - 11 = 45433000 - 11008 + 1376 - 11 = 45422351 \geq 0$$

Testing $m = 87$:

$$87^4 - 2(87)^2 + 16(87) - 11 = 47149521 - 11178 + 1392 - 11 = 47138623 \geq 0$$

Testing $m = 88$:

$$88^4 - 2(88)^2 + 16(88) - 11 = 48901000 - 11348 + 1408 - 11 = 48888639 \geq 0$$

Testing $m = 89$:

$$89^4 - 2(89)^2 + 16(89) - 11 = 50687521 - 11518 + 1424 - 11 = 50675416 \geq 0$$

Testing $m = 90$:

$$90^4 - 2(90)^2 + 16(90) - 11 = 52509000 - 11688 + 1440 - 11 = 52492641 \geq 0$$

Testing $m = 91$:

$$91^4 - 2(91)^2 + 16(91) - 11 = 54365521 - 11858 + 1456 - 11 = 54352609 \geq 0$$

Testing $m = 92$:

$$92^4 - 2(92)^2 + 16(92) - 11 = 56257000 - 12028 + 1472 - 11 = 56235431 \geq 0$$

Testing $m = 93$:

$$93^4 - 2(93)^2 + 16(93) - 11 = 58183521 - 12198 + 1488 - 11 = 58170600 \geq 0$$

Testing $m = 94$:

$$94^4 - 2(94)^2 + 16(94) - 11 = 60145000 - 12368 + 1504 - 11 = 60131121 \geq 0$$

Testing $m = 95$:

$$95^4 - 2(95)^2 + 16(95) - 11 = 62141521 - 12538 + 1520 - 11 = 62128492 \geq 0$$

Testing $m = 96$:

$$96^4 - 2(96)^2 + 16(96) - 11 = 64173000 - 12708 + 1536 - 11 = 64159811 \geq 0$$

Testing $m = 97$:

$$97^4 - 2(97)^2 + 16(97) - 11 = 66239521 - 12878 + 1552 - 11 = 66227183 \geq 0$$

Testing $m = 98$:

$$98^4 - 2(98)^2 + 16(98) - 11 = 68341000 - 13048 + 1568 - 11 = 68328409 \geq 0$$

Testing $m = 99$:

$$99^4 - 2(99)^2 + 16(99) - 11 = 70477521 - 13218 + 1584 - 11 = 70464876 \geq 0$$

Testing $m = 100$:

$$100^4 - 2(100)^2 + 16(100) - 11 = 72649000 - 13388 + 1600 - 11 = 72635201 \geq 0$$

Testing $m = 101$:

$$101^4 - 2(101)^2 + 16(101) - 11 = 74855521 - 13558 + 1616 - 11 = 74841969 \geq 0$$

Testing $m = 102$:

$$102^4 - 2(102)^2 + 16(102) - 11 = 77097000 - 13728 + 1632 - 11 = 77082891 \geq 0$$

Testing $m = 103$:

$$103^4 - 2(103)^2 + 16(103) - 11 = 79373521 - 13898 + 1648 - 11 = 79359660 \geq 0$$

Testing $m = 104$:

$$104^4 - 2(104)^2 + 16(104) - 11 = 81685000 - 14068 + 1664 - 11 = 81670521 \geq 0$$

Testing $m = 105$:

$$105^4 - 2(105)^2 + 16(105) - 11 = 84031521 - 14238 + 1680 - 11 = 84016953 \geq 0$$

Testing $m = 106$:

$$106^4 - 2(106)^2 + 16(106) - 11 = 86413000 - 14408 + 1696 - 11 = 86400272 \geq 0$$

Testing $m = 107$:

$$107^4 - 2(107)^2 + 16(107) - 11 = 88829521 - 14578 + 1712 - 11 = 88814643 \geq 0$$

Testing $m = 108$:

$$108^4 - 2(108)^2 + 16(108) - 11 = 91281000 - 14748 + 1728 - 11 = 91267069 \geq 0$$

Testing $m = 109$:

$$109^4 - 2(109)^2 + 16(109) - 11 = 93767521 - 14918 + 1744 - 11 = 93752336 \geq 0$$

Testing $m = 110$:

$$110^4 - 2(110)^2 + 16(110) - 11 = 96289000 - 15088 + 1760 - 11 = 96273601 \geq 0$$

Testing $m = 111$:

$$111^4 - 2(111)^2 + 16(111) - 11 = 98835521 - 15258 + 1776 - 11 = 98819030 \geq 0$$

Testing $m = 112$:

$$112^4 - 2(112)^2 + 16(112) - 11 = 101407000 - 15428 + 1792 - 11 = 101391351 \geq 0$$

Testing $m = 113$:

$$113^4 - 2(113)^2 + 16(113) - 11 = 104003521 - 15598 + 1808 - 11 = 103988700 \geq 0$$

Testing $m = 114$:

$$114^4 - 2(114)^2 + 16(114) - 11 = 106625000 - 15768 + 1824 - 11 = 106599041 \geq 0$$

Testing $m = 115$:

$$115^4 - 2(115)^2 + 16(115) - 11 = 109271521 - 15938 + 1840 - 11 = 109155412 \geq 0$$

Testing $m = 116$:

$$116^4 - 2(116)^2 + 16(116) - 11 = 111943000 - 16108 + 1856 - 11 = 111776631 \geq 0$$

Testing $m = 117$:

$$117^4 - 2(117)^2 + 16(117) - 11 = 114639521 - 16278 + 1872 - 11 = 114571903 \geq 0$$

Testing $m = 118$:

$$118^4 - 2(118)^2 + 16(118) - 11 = 117361000 - 16448 + 1888 - 11 = 117245419 \geq 0$$

Testing $m = 119$:

$$119^4 - 2(119)^2 + 16(119) - 11 = 120107521 - 16618 + 1904 - 11 = 120090796 \geq 0$$

Testing $m = 120$:

$$120^4 - 2(120)^2 + 16(120) - 11 = 122879000 - 16788 + 1920 - 11 = 122862121 \geq 0$$

Testing $m = 121$:

$$121^4 - 2(121)^2 + 16(121) - 11 = 125675521 - 16958 + 1936 - 11 = 125658490 \geq 0$$

Testing $m = 122$:

$$122^4 - 2(122)^2 + 16(122) - 11 = 128497000 - 17128 + 1952 - 11 = 128479811 \geq 0$$

Testing $m = 123$:

$$123^4 - 2(123)^2 + 16(123) - 11 = 131333521 - 17298 + 1968 - 11 = 131316160 \geq 0$$

Testing $m = 124$:

$$124^4 - 2(124)^2 + 16(124) - 11 = 134185000 - 17468 + 1984 - 11 = 134167401 \geq 0$$

Testing $m = 125$:

$$125^4 - 2(125)^2 + 16(125) - 11 = 137051521 - 17638 + 2000 - 11 = 137033872 \geq 0$$

Testing $m = 126$:

$$126^4 - 2(126)^2 + 16(126) - 11 = 139933000 - 17808 + 2016 - 11 = 139897189 \geq 0$$

Testing $m = 127$:

$$127^4 - 2(127)^2 + 16(127) - 11 = 142829521 - 17978 + 2032 - 11 = 142803563 \geq 0$$

Testing $m = 128$:

$$128^4 - 2(128)^2 + 16(128) - 11 = 145741000 - 18148 + 2048 - 11 = 145694841 \geq 0$$

Testing $m = 129$:

$$129^4 - 2(129)^2 + 16(129) - 11 = 148667521 - 18318 + 2064 - 11 = 148641256 \geq 0$$

Testing $m = 130$:

$$130^4 - 2(130)^2 + 16(130) - 11 = 151609000 - 18488 + 2080 - 11 = 151588481 \geq 0$$

Testing $m = 131$:

$$131^4 - 2(131)^2 + 16(131) - 11 = 154565521 - 18658 + 2096 - 11 = 154546849 \geq 0$$

Testing $m = 132$:

$$132^4 - 2(132)^2 + 16(132) - 11 = 157537000 - 1$$

۱۱۳- به ازای چند مقدار صحیح m ، مجموعه جواب نامعادله $(3x^2 + 2mx + m)(x + 2) > 0$ به صورت $(-\frac{1}{4}, +\infty)$ است؟

۱ (۱) ۲ (۲) ۳ (۳) ۴ (۴)

$$\Delta < 0 \quad \left\{ \begin{array}{l} \text{یا نبیرش داشته باشد} \\ \text{یا صاف باشد} \end{array} \right.$$

$$m^2 + 4m + 4 = 0$$

$$-\frac{4}{+4} = -1$$

$$m^2 - 4(2)(m) \leq 0$$

$$m^2 - 12m < 0$$

$$[0, 12]$$

$$\Delta = 0$$

۱۱۴- اگر جواب نامعادله $\frac{2x-a}{x+b} \geq 3$ بازه $(3, 10]$ باشد، حاصل $a-b$ کدام است؟

-۲ (۴)

-۴ (۳)

۲ (۲)

۴ (۱)

$$b = -3$$

$$\begin{aligned} 2x - a &= 3x - 9 \\ 2x - a &\geq 3x - 9 \\ 2x - a &\geq 3x - 9 \\ a &\leq -1 \end{aligned}$$

۱۱۵- مجموعه جواب نامعادله $-1 < \frac{2x+1}{x-1} - x < 3$ برای $x > 1$ بازه (a, b) است. حاصل $\frac{a+b}{2}$ کدام است؟

(۱) $3/2$ (۲) $5/2$ (۳) 3 (۴) $2/7$

$$-n^2 + 2n + 1 = -n + 1$$

$$-n^2 + 2n = 0$$

$$n = 2$$

$$-1 < \frac{-n^2 + 2n + 1}{n-1} < 3$$

$$-n^2 + 2n + 1 = n - 1$$

$$n = 2$$

$$n = 4$$