NOTA means "None of the Above"

1. A dart is thrown and hits somewhere inside the pentagon that is traced out when the following coordinates are drawn in succession: (-5, 1), (-1, 5), (2, 7), (3, -2), and (-1, -6). What is the probability that the dart is also in the triangle defined by connecting (-1, 3), (2, 2.5), and (0, -1.5)?

A) $\frac{23}{344}$ B) $\frac{1}{9}$ C) $\frac{13}{86}$ D) $\frac{1}{8}$ E) NOTA

2. Given oblique triangle ABC with sides a, b, c across from their respective angles. What is the length of c?

A) $a^2+b^2-2ab\cos C$ C) $b^2+c^2-2bc\cos A$

B) $\frac{\sin B}{b\sin C}$ D) $\frac{a\sin C}{\sin A}$ E) NOTA

3. If $f(x)=\frac{1}{(x+1)(x-2)}$ and $g(x)=\frac{1}{x}$, then what is the domain of $f(g(x))$?

A) $\left\{\mathbf{R}\neq -1, \frac{1}{2}, 0\right\}$ B) $\left\{\mathbf{R}\neq -1, \frac{1}{2}\right\}$ C) $\{\mathbf{R}\neq -1, 2\}$

D) $\{\mathbf{R}\neq -1, 2, 0\}$ E) NOTA

4. Find the solution set for $\log_e(x+5)-\ln(x+2)=\frac{1}{2}\ln(x+4)^2-\frac{\log(x+3)}{\log e}$

A) $\{-5,-4\}$ B) $\left\{-\frac{7}{2}\right\}$ C) $\varnothing$ D) $\left\{-\frac{1}{2}\pm\frac{\sqrt{-13}}{2}\right\}$ E) NOTA

5. $f(x)=\csc x$ $g(x)=Sin^{-1}x$ $h(x)=|\sin x|$ $j(x)=\cos\left(x-\frac{\pi}{2}\right)$

$k(x)=e^{x^2}$ $r(x)=\ln|x|$ $t(x)=x^3+x$

Of the preceding seven graphs, let A = the number of odd functions, let B = the number of even functions, and let $C=r\circ k(2)$. Find $A\div B\div C$ to the nearest hundredth.

A) .33 B) 1 C) .67 D) .25 E) NOTA

6. $b(x)=i^x$. Find $b(1)b(4)b(\frac{1}{2})b(\frac{1}{8})$.

A) $i(-1)^{\frac{5}{16}}$ B) 1 C) $i^{\frac{5}{8}}$ D) $-i^{\frac{5}{8}}$ E) NOTA

7. Find the locus of points such that the sum of the distances between (8, 4) and (-1, 4) is a constant 15. Give its area.

A) 48π B) 45π C) $\frac{135}{4}\pi$ D) 2025π E) NOTA

8. $\lim_{x\to 1^+}\frac{x^2-3x-10}{x^3-4x^2-7x+10}$

A) 0 B) $-\infty$ C) undefined D) ∞ E) NOTA

9. What is the frequency of $y=\sin 2x+\cos x$ to the nearest hundredth?

A) .32 B) .16 C) 3.14 D) 6.28 E) NOTA

10. What is the range of $y=Csc^{-1}x$?

A) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ B) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ C) $\left[0,\frac{\pi}{2}\right)\cup\left(\frac{\pi}{2},\pi\right]$ D) $\left[-\frac{\pi}{2},0\right)\cup\left(0,\frac{\pi}{2}\right]$ E) NOTA

11. $f(x)=x-\frac{x^3}{3!}+\frac{x^5}{5!}-\frac{x^7}{7!}+\frac{x^9}{9!}-\frac{x^{11}}{11!}+\ldots$ Give the value of $f(2)$ to seven decimal places.

A) -.4161468 B) 2.7182818 C) .9092974 D) .9092975 E) NOTA

12. Which of the following are the roots of $x^4+\frac{625}{2}-\frac{625}{2}\sqrt{3}i=0$?

I. $\frac{5}{2}+\frac{5}{2}\sqrt{3}i$ III. $\frac{5}{2}-\frac{5}{2}\sqrt{3}i$ V. $-\frac{5}{2}+\frac{5}{2}\sqrt{3}i$ VII. $-\frac{5}{2}-\frac{5}{2}\sqrt{3}i$

II. $\frac{5}{2}\sqrt{3}+\frac{5}{2}i$ IV. $\frac{5}{2}\sqrt{3}-\frac{5}{2}i$ VI. $-\frac{5}{2}\sqrt{3}+\frac{5}{2}i$ VIII. $-\frac{5}{2}\sqrt{3}-\frac{5}{2}i$

A) I, IV, V, VIII B) I, IV, VI, VII C) II, III, VI, VII D) II, III, V, VIII E) NOTA

13. $\frac{\sin x}{\cot x}\cdot\frac{\tan x}{\csc x}=$

A) $\sin^2 x$ B) $\tan^2 x$ C) $\frac{\sin^2 x}{\cos^4 x}$ D) 1 E) NOTA

14. Sarah and Lina are playing tether ball. The ball itself is negligible (like a point), and swings around the pole at a constant distance of 5 feet from the pole. Lina hits it very, very hard, and it swings 13 times around and another $\frac{720}{13}$ degrees of the circle. To the nearest hundredth of a foot, how far did the ball travel?

A) 685.33 B) 685.34 C) 413.24 D) 413.25 E) NOTA

15. The number of loops in $r^2 = 9\cos 2\theta$ plus the number of petals in $r = 4\cos 3\theta$ is
A) 10 B) 8 C) 7 D) 5 E) NOTA

16. How many of the following six statements are identities?
I. $\tan 2x = \dfrac{2\tan x}{1-\tan^2 x}$ II. $\tan\frac{1}{2}x = \dfrac{\sin x}{1-\cos x}$
III. $\sin A\cos B = \frac{1}{2}[\sin(A+B)+\sin(A-B)]$
IV. $\sin(A+B) = \sin A\cos B - \cos A\sin B$
V. $1+\cot^2 x = \sec^2 x$ VI. $\cos^4 x - \sin^4 x = \cos^2 x - \sin^2 x$
A) 2 B) 3 C) 4 D) 5 E) NOTA

17. What is the area of a regular 27-gon with side length of 4 inches, to the nearest square inch?
A) 924 B) 936 C) 967 D) 1242 E) NOTA

18. The centroid of the triangle with vertices (10, 17), (-10, 20), and (-1, -15) has coordinates (a,b). Find $\ln|ab|$ to the nearest hundredth.
A) 1.70 B) .89 C) 1.99 D) 2.40 E) NOTA

19. What substitutions for x and y could be made in order to eliminate the xy term in $7x^2 - 6\sqrt{3}xy + 13y^2 - 16 = 0$?

A) $x = x'\left(\frac{\sqrt{3}}{2}\right) + y'\left(\frac{1}{2}\right)$, $y = x'\left(\frac{1}{2}\right) + y'\left(\frac{\sqrt{3}}{2}\right)$

B) $x = x'\left(\frac{1}{2}\right) - y'\left(\frac{\sqrt{3}}{2}\right)$, $y = x'\left(\frac{\sqrt{3}}{2}\right) + y'\left(\frac{1}{2}\right)$

C) $x = x'\left(\frac{1}{2}\right) + y'\left(\frac{\sqrt{3}}{2}\right)$, $y = x'\left(\frac{\sqrt{3}}{2}\right) + y'\left(\frac{1}{2}\right)$

D) $x = x'\left(\frac{\sqrt{3}}{2}\right) - y'\left(\frac{1}{2}\right)$, $y = x'\left(\frac{1}{2}\right) + y'\left(\frac{\sqrt{3}}{2}\right)$

E) NOTA

20. Describe, in accurate detail, the polar graph $r = 4\cos\theta - 2$.
A) cardioid/cardiod
B) dimpled (dented) limacon
C) limacon with an inner loop
D) convex limacon
E) NOTA

21. $\sqrt{x}\sqrt[6]{x} = \sqrt[3]{x} - \frac{1}{4}$. Give $\frac{\ln x}{x}$ to the nearest hundredth.
A) -16.64 B) -266.17 C) -44.36 D) -5.55 E) NOTA

22. Given A(2, 4, 2), B(-2, -4, 1), C(5, -2, -3), and D(-3, 4, 2), what is the volume of the parallelepiped with vector edges $\overrightarrow{AB}$, $\overrightarrow{AC}$, and $\overrightarrow{AD}$?
A) $28\frac{1}{3}$ B) 156 C) 170 D) 256 E) NOTA

23. $\vec{u} = 3\vec{i} - \vec{j} + 2\vec{k}$ and $\vec{v} = \vec{i} + 2\vec{j} + 3\vec{k}$, $\vec{u} \cdot \vec{v} =$
A) 4 B) 5 C) 6 D) 7 E) NOTA

24. What is the area enclosed by $x = \frac{2}{127} + \frac{37}{4}\cos\theta$ and $y = \frac{11}{9} - \frac{311}{16}\sin\theta$, to the nearest square unit?
A) 565 B) 0 C) 101558 D) 575 E) NOTA

25. Find the constant term in the expansion of $\left(4x^5 + \frac{1}{2}x^{-3}\right)^{16}$.
A) 1024 B) 4096 C) 8008 D) 32032 E) NOTA

26. In a 34, 40, 71 triangle, find the smallest angle (nearest second).
A) 147°8'52" B) 15°3'25" C) 15°3'24" D) 147°8'53" E) NOTA

27. Find the tangent line to $y = x^4 - x^3 + \frac{7}{2}x^2 - 5x + 49.2$ when x = 2. This line can be used to approximate values of the polynomial near x = 2. Find the absolute value of the difference between the true y-value at x = 2.1 and the tangent line's y-value at x = 2.1.
A) .0619 B) .2221 C) 30.6479 D) .222 E) NOTA

28. The probability that Kory beats Hayley is .4. What is the probability that Kory beats Hayley at the next 6 out of 10 competitions (round to the nearest thousandth)?
A) .250 B) .251 C) .111 D) .112 E) NOTA

29. $\cot A = -\frac{4}{3}$, where A is in quadrant II, and $\csc B = -\frac{41}{40}$, where B is in quadrant IV. Find $\cos(A + B)$, to the nearest thousandth.
A) .589 B) .590 C) .409 D) .410 E) NOTA

30. $f(x) = x^2 - 2x + 4$, $f(1) =$
A) 2 B) 3 C) 4 D) 5 E) NOTA

1. If $f(x)=\ln(e^x)$, find the value of $f(\sin 30°)+f(\cos 135°)$ to the nearest thousandth.

2. For $64x^2-25y^2+512x+350y-1801=0$, let
$m_1=a$ and $m_2=b$ be the slopes of the asymptotes
the length of one latus rectum be c
the length of the conjugate axis be d
Find $abcd$ to the nearest integer.

3. F = the distance between (-7, 5) and $9x+40y-6=0$.
G = the distance between (2, -1, 4) and $3x+9y-5z+2=0$.
H = the distance between $2x-3y-z+5=0$ and $2x-3y-z+7=0$.
J = the distance between (1, 1) and (2, 1).
Find FGHJ to the nearest hundredth.

4. $g(x)=\dfrac{x^3-9x^2+23x-15}{x-3}$. Statements below about $g(x)$ have values to the left of them. Add the value(s) of the false statement(s) (disregard the true statements).

(-1) $g(x)$ has a removable discontinuity at x = 3.
(2) If $g(x)$ existed at x = 3, the corresponding y-value would be 4.
(5) The limit as x approaches 3 from the left of $g(x)$ equals the limit as x approaches 3 from the right of $g(x)$.
(-2) $\lim\limits_{x\to 3} g(x)$ exists.
(-7) $g(x)$ is continuous at x = 3.

5. Find the exact value of the product of the solutions of $\cos^2(\ln x)-5\cos(\ln x)-6=0$ on the interval $(20, 12400]$.

6. $D=\sum_{n=1}^{\infty}\left(\frac{8}{3}\right)^{-n}$ $\qquad U=\sum_{x=4}^{89}(x+1)$

C = the number of terms that are added together to simplify $\sum_{k=49}^{317}\left(\frac{k\pi}{107}\right)^2$

$K=\log\frac{1}{2}+\log\frac{2}{3}+\log\frac{3}{4}+\ldots+\log\frac{98}{99}+\log\frac{99}{100}$

Find (the lucky) $DUCK$.

7. $A=$ the sum of the roots of $2x^3+12x^2+15x-10=0$
$B=$ the sum of the roots taken two at a time of $2x^3+5x^2-62x-40=0$
$C=$ the product of the roots of $3x^3+7x^2-18x-360=0$

Find the roots of $x^3+Ax^2+Bx+C=0$. If D, E, and F are the roots, where $D<E<F$, find $D-E-F$.

8. $\lim_{x\to\infty}\frac{3x^2+5x^3+5x-2}{2x^2+4x^3+13x-4}+\lim_{x\to 0}\left(\frac{\sin x}{x}+\frac{\cos x-1}{x}\right)+\lim_{x\to 4}\frac{3}{4}$

9. A new bridge is being constructed that is 35 feet long (horizontally). For the first 20 feet, it is a quarter-ellipse, and for the last 15 feet, it is a quarter circle. The radius of the circle is 15 feet, which is also the length of the semi-minor axis of the ellipse, the tallest point on the bridge. Find the distance 10 feet horizontally from the end of the elliptical side, plus the distance 30 feet from the end of the elliptical side (to the nearest tenth).

10. $\|\vec{u}\|=5$ and $\|\vec{v}\|=7$. The tangent of the first-quadrant angle between $\vec{u}$ and $\vec{v}$ is $\frac{3}{4}$. Let

M = $\vec{u}\cdot\vec{v}$

A = the norm of the outer product of $\vec{u}$ and $\vec{v}$

T = the length of $\vec{u}$ H = the length of $\vec{v}$

Find the exact value of MAT + H.

11. Critical points of a function are points on the curve whose x-values are those of the derivative set equal to zero. Find the midpoint of the two critical points of $\frac{1}{3}x^3-x^2-15x+4=0$. Round your ordinate to two decimal places.

12. C = the slope of $3x+5y-2=0$

L = x^2+y^2 if $x+y=10$ and $xy=20$

I = the number of zeros at the end of 600! É = $(1+i)^{12}$

H = the product of the period and the amplitude of $y=3\tan 4x-\pi$

To the nearest integer, find the value of CLICHÉ.

13. $\sum_{x=1}^{52}\left(e^{\ln x^2}+i^x+x^3\right)=$

14. A = the area of a 6, 7, 12 triangle

B = the length of the angle bisector to side c in Triangle ABC if side a = 3, side b = 4, and side c = 5 (round to the nearest hundredth)

C = the number of digits in 3^{63}

D = the number of distinguishable ways of rearranging the letters in WEHTAMRETXAB Find the value of $\frac{ABCD}{10000}$ to the nearest integer.

15. $A=i^i$ hint (if you need it): use $cis\theta=e^{i\theta}$ $B=\frac{e^{i\frac{3\pi}{4}}\cdot e^{i\frac{5\pi}{6}}}{e^{i\frac{\pi}{2}}}$

$C=(4cis55°)(2cis65°)$ $D=i^{2004!}$

Find $|BC|+D+A$ to the nearest hundredth.

Pre-calculus Regional Answers

1 B
2 D
3 A
4 C
5 A
6 A
7 B
8 D
9 B
10 D
11 C
12 D
13 E
14 C
15 D
16 B
17 A
18 B
19 D
20 C
21 A
22 C
23 D
24 A
25 D
26 C
27 B
28 C
29 D
30 B

Team Round

1 -.207
2 -1049
3 3.34
4 -5
5 $e^{4\pi}$
6 -1,318,638
7 -16
8 3
9 24.2
10 2,947
11 (1, -11.67)
12 -482,066
13 1,947,114
14 6,726,434
15 9.21

Pre-calculus March Regional Individual Solutions

1. Use the coordinate area formula. Coordinates are in order, repeat first set of coordinates, multiply diagonals, and divide by 2.

Pentagon

	−5	1	
−1	−1	5	−25
10	2	7	−7
21	3	−2	−4
2	−1	−6	−18
30	−5	1	−1
62	−		(−55)

$$\frac{62+55}{2}=\frac{117}{2}$$

Triangle

	−1	3	
6	2	2.5	−2.5
0	0	−1.5	−3
1.5	−1	3	0
7.5	−		(−5.5)

$$\frac{7.5+5.5}{2}=\frac{13}{2}$$

$$\frac{\frac{13}{2}}{\frac{117}{2}}=\frac{1}{9}\quad \boxed{B}$$

2. Both A and B use the Law of Cosines, but forget the square root. So C and D use the Law of Sines, but only $\boxed{D}$ uses it correctly.

3. The domain of f(g(x)) is the domain of g(x) and (union) the domain of the simplified composition f(g(x)). The domain of g eliminates x = 0, and $f(g(x))=\dfrac{1}{\left(\frac{1}{x}+1\right)\left(\frac{1}{x}-2\right)}$, and upon setting the denominator = 0, we also eliminate x = -1, and x = ½. $\boxed{A}$

4. The equation reduces to natural logs, leading to a rational equation:

$$\ln(x+5)-\ln(x+2)=\ln(x+4)-\ln(x+3)$$

$$\ln\left(\frac{x+5}{x+2}\right)=\ln\left(\frac{x+4}{x+3}\right)$$

$$\frac{x+5}{x+2}=\frac{x+4}{x+3}$$

$$x^2+8x+15=x^2+6x+8$$

$$2x=-7$$

$$x=-3.5$$

If -3.5 is plugged back into the original equation, it does not work: $\boxed{C}$

5. f, g, j, and o are the odd functions, so A = 4 (remember f(-x) = -f(x)). h, k, and r are the even functions (f(-x) = f(x)), so B = 3. C = 4.

$4\div3\div4=.33$ $\boxed{A}$

6. $i \cdot 1 \cdot i^{\frac{1}{2}} \cdot i^{\frac{1}{8}} = i \cdot i^{\frac{1}{2}+\frac{1}{8}} = i \cdot i^{\frac{5}{8}} = i \cdot (-1)^{\frac{1}{2} \cdot \frac{5}{8}} = i(-1)^{\frac{5}{16}}$ A

7. (8, 4) and (-1, 4) are the foci, and their midpoint (3.5, 4) is the center of the ellipse. The distance between the center and a focus is c, so c = 4.5. The constant is 2a, so a = 7.5. Since $a^2 = b^2 + c^2$, $\frac{225}{4} = b^2 + \frac{81}{4}$, $b = \sqrt{\frac{144}{4}} = 6$, and the area is $ab\pi = \frac{15}{2} \cdot 6\pi = 45\pi$ B

8. 1 is a root of the denominator, so we can synthetically divide by 1, and notice now that both quadratics in the numerator and denominator are equal, so they cancel, and we are left with $\frac{1}{x-1}$. A simple graph of 1/x shifted horizontally 1 shows that as we approach from the right, the limit is infinity. D

9. The frequency is the reciprocal of the period. The period is the least common multiple of both of the periods of the two added functions. The period of one is pi, and the period of the other is 2pi. So the period is 2pi, and the frequency is .16. B

10. Draw a graph of cscx, and then flip it over y = x. D.

11. f(x) is the Taylor Series for sinx. sin2 = .9092974 C

12. $-\frac{625}{2} + \frac{625}{2}\sqrt{3}i = 625cis120°$. Using DeMoivre's Theorem: $(625cis120)^{\frac{1}{4}} = 5cis30,\ 5cis120,\ 5cis210,\ 5cis300$. Convert to rectangular, and they are (respectively) II, V, VIII, and III. D

13. Simplifies to $\sin^2 x \tan^2 x$ E

14. The circumference 13 times is $13 \cdot 2\pi(5) = 130\pi$. $\frac{720}{13}° = \frac{4\pi}{13}$. That is the angle, and use $s = r\theta \Rightarrow 5\left(\frac{4\pi}{13}\right) = \frac{20\pi}{13}$. $\frac{20\pi}{13} + 130\pi = 413.24$ C

15. A lemniscate has two loops, and a rose has n petals in $\cos n\theta$ for n odd, 2n petals in $\cos n\theta$ if n is even. 2 + 3 = 5 D

16. Test yourself (maybe know them). II, IV, and V are not B

17. The area of an n-gon with side length "a" is $a^2 \frac{n}{4} \cot\left(\frac{180}{n}°\right)$. You can use this, or do your geometry: 924. A

18. Take the average of the coordinates: $\left(-\frac{1}{3}, \frac{22}{3}\right) \Rightarrow \ln\left(\frac{22}{9}\right) = .89$ B

19. Angle rotation formulas: $x = x'\cos\theta - y'\sin\theta$, $y = x'\sin\theta + y'\cos\theta$, where θ is the angle of rotation, where $\tan 2\theta = \frac{B}{A-C}$. The angle ends up being $\tan 2\theta = \sqrt{3} \Rightarrow 2\theta = 60° \Rightarrow \theta = 30°$ [D]

20. In $r = a + b\cos\theta$ (can replace cos with sin), take the ratio a/b. If it is less than one, it is a limacon with an inner loop; if it is one, it is a cardioid; if it is between one and two (exclusive), it is a dimpled limacon; and if it is greater than two, it is a convex limacon. a/b = ½ [C]

21. Simplify to

$$x^{\frac{2}{3}} - x^{\frac{1}{3}} + \frac{1}{4} = 0$$

$$\left(x^{\frac{1}{3}} - \frac{1}{2}\right)^2 = 0$$

$$x = \frac{1}{8} \qquad -8\ln 8 \approx -16.64 \text{ [A]}$$

22. To take vector edges, subtract: B - A, C - A, and D - A. The volume is the triple scalar product: $\overrightarrow{AB} \bullet \left(\overrightarrow{AC} \times \overrightarrow{AD}\right)$, or simply $\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix}$, if a, b, etc. are the components of AB, AC, and AD. Take the absolute value of the determinant: $\begin{vmatrix} -4 & -8 & -1 \\ 3 & -6 & -5 \\ -5 & 0 & 0 \end{vmatrix} = 170$ [C]

23. $(3)(1) + (-1)(2) + (2)(3) = 7$ [D]

24. $x = a + b\cos\theta$, $y = c + d\sin\theta$ is an ellipse, whose area is

$$bd\pi \Rightarrow \left(\frac{37}{4}\right)\left(\frac{311}{16}\right)\pi = 565 \text{ [A]}$$

25. Try and get exponents that will cancel when you simplify the term. By inspection (trial and error), you need to raise the first term to the sixth power, the second to the 10th power.

$$_nC_r\left(4x^5\right)^6\left(\frac{1}{2}x^{-3}\right)^{10} \Rightarrow {}_{16}C_6\left(4096\right)x^{30} \bullet \frac{1}{1024x^{30}} = 8008 \bullet 4 = 32032 \text{ [D]}$$

26. Smallest angle opposite the smallest side. Law of cosines:

$34^2 = 40^2 + 71^2 - 2 \bullet 71 \bullet 40\cos\theta \Rightarrow \theta = 15.0567.... \rightarrow DMS = 15°3'24"$ [C]

27. The derivative is $4x^3 - 3x^2 + 7x - 5$, evaluated at x = 2 is 29. This is the slope of the tangent line. The value of the polynomial at 2 is 61.2.

The tangent line is $y-61.2=29(x-2)$. The polynomial at x = 2.1 is 64.3221, and the tangent line at x = 2.1 is 64.1. .2221 $\boxed{B}$

28. ${}_{10}C_6(.4)^6(.6)^4=.111$ $\boxed{C}$

29. Make sure they're in the right quadrant. $\boxed{D}$ 30. Duh. $\boxed{B}$

1. f(x) = x, so you have ½ + $\frac{-1}{\sqrt{2}} = \boxed{-.207}$

2. Complete the square

$$64(x^2+8x+16)-25(y^2-14y+49)=1801+1024-1225$$

$$64(x+4)^2-25(y-7)^2=1600$$

$$\frac{(x+4)^2}{25}-\frac{(y-7)^2}{64}=1$$

The slopes of the asymptotes are $\pm\frac{b}{a}=\pm\frac{8}{5}$. The length of the latus rectum is $\frac{2b^2}{a}$, and you get $\frac{2(64)}{5}=\frac{128}{5}$. The length of the conjugate axis is 2b, or 16. Final answer: $\left(-\frac{64}{25}\right)\bullet\frac{128}{5}\bullet 16\approx\boxed{-1049}$

3. F) $\frac{|9(-7)+40(5)-6|}{\sqrt{81+1600}}=3.195...$

G) $\frac{|3(2)+9(-1)-5(4)+2|}{\sqrt{9+81+25}}=1.958...$

H) One point on first one is (0, 0, 5): $\frac{|0+0-5+7|}{\sqrt{4+9+1}}=.534...$

J) It's 1.

FGHJ = $\boxed{3.34}$

4. If you divide, $g(x)=x^2-6x+5$. So the graph is a parabola, with a hole at x = 3. It has a removable discontinuity at x = 3, but if it existed, the value would be 9 - 18 + 5 = -4. The limit from the right equals the limit from the left (at 3), so the limit itself exists. However, g(x) is not continuous at x = 3 because x = 3 does not exist. 2 - 7 = $\boxed{-5}$

5. You can substitute $y=\cos(\ln x)$ for $y^2-5y-6=0$, and factor: $(\cos(\ln x)-6)(\cos(\ln x)+1)=0$. Cosine of nothing will be 6, so you need to solve $\cos(\ln x)=-1$. Cosine is -1 at $-\pi,\pi,3\pi,5\pi,7\pi$, etc. Find e up to those numbers, and which are in the interval: $e^{\pi}\bullet e^{3\pi}=\boxed{e^{4\pi}}$

6. D) $\frac{\frac{3}{8}}{1-\frac{3}{8}}=\frac{3}{5}$

U) $\frac{86}{2}(5+90)=4085$

C) Use the top minus bottom plus one. 317 - 49 + 1 = 269

K) $\log\left(\frac{1}{2}\frac{2}{3}\frac{3}{4}\frac{4}{5}\cdots\frac{99}{100}\right)=\log\left(\frac{1}{100}\right)=-2$

$.6 \cdot 4085 \cdot 269 \cdot -2 = \boxed{-1318638}$

7. A) $-\frac{12}{2}=-6$

B) $-\frac{62}{2}=-31$

C) $-\frac{-360}{3}=120$ Now you have the equation $x^3-6x^2-31x+120$, whose roots are -5, 3, and 8. -5 - 3 - 8 = $\boxed{-16}$

8. $\frac{5}{4}+1+0+\frac{3}{4}=\boxed{3}$

9. Use a = 20, b = 15 for the ellipse, you have $\frac{x^2}{400}+\frac{y^2}{225}=1$, and the circle would be $x^2+y^2=225$. Use the ellipse with x = -10 (or 10, doesn't matter), and the circle with x = 10 for $12.9...+11.1...=\boxed{24.2}$

10.

$M=\|u\|\|v\|\cos\theta=5 \cdot 7 \cdot \frac{4}{5}=28$

$A=\|u\|\|v\|\sin\theta=5 \cdot 7 \cdot \frac{3}{5}=21$ $\qquad 28 \cdot 21 \cdot 5+7=\boxed{2947}$

$T=5$

$H=7$

11. The derivative is $x^2-2x-15=0$, zeros at 5 and -3. The corresponding y-values are $-54\frac{1}{3}$ and 31. The midpoint is (1, -11.67).

12. C) slope is -3/5

L) 100 - 2(20) = 60

I) 600/5 + 600/25 + 600/125 = 148

É = $(2i)^6=-64$

H = $\frac{\pi}{4} \cdot 3$

CLICHÉ = $\frac{-3}{5} \cdot 60 \cdot 148 \cdot \frac{-3}{5} \cdot \frac{3\pi}{4} \cdot -64=\boxed{-482066}$

13. $\sum_{x=1}^{52}\left(x^2+x^3\right)=\frac{1}{6}52(53)(105)+\frac{1}{4}52^2 53^2=\boxed{1947114}$

14. A) Heron's formula: $\frac{\sqrt{3575}}{4}$

B) $\sqrt{ab\left(1-\frac{c^2}{(a+b)^2}\right)} = 2.424366...$

C) $63\log 3 = 30.05... = 31$

D) 12!/(2*2*2)= 59875200

ABCD/10000 = **6,726,434**

15. A) $(cis90)^i = \left(e^{i\frac{\pi}{2}}\right)^i = e^{i^2\frac{\pi}{2}} = e^{-\frac{\pi}{2}}$

B) $e^{i\left(\frac{3\pi}{4}+\frac{5\pi}{6}-\frac{\pi}{2}\right)} = e^{i\frac{13}{12}\pi}$

C) 8cis120

D) Exponent is divisible by 4: 1.

BC is the magnitude of B times the magnitude of C, which is still 8.

$8+1+e^{-\frac{\pi}{2}} = \boxed{9.21}$