T M S C A H I G H S C O O L

M A T H E M A T I C S

T E S T # 9 ©

F E B R U A R Y 1 , 2 0 2 0

GENERAL DIRECTIONS

1. About this test:
   A. You will be given 40 minutes to take this test.
   B. There are 60 problems on this test.
2. All answers must be written on the answer sheet/Scantron form/Chatsworth card provided. If you are using an answer sheet, be sure to use **BLOCK CAPITAL LETTERS**. Clean erasures are necessary for accurate grading.
3. If using a scantron answer form, be sure to correctly denote the number of problems not attempted.
4. You may write anywhere on the test itself. You must write only answers on the answer sheet.
5. You may use additional scratch paper provided by the contest director.
6. All problems have **ONE** and **ONLY ONE** correct [BEST] answer. There is a penalty for all incorrect answers.
7. Calculators used on this test must be conform to the UIL standards. Graphing calculators are allowed. Calculators need not be cleared.
8. All problems answered correctly are worth **SIX** points. **TWO** points will be deducted for all problems answered incorrectly. No points will be added or subtracted for problems not answered.
9. In case of ties, percent accuracy will be used as a tie breaker.

2019-2020 TMSCA High School Math Test 9

1. **Evaluate:** $12\times 3!\times 3^{-2}+9^{0}-11\times 4+5^{2}$

   (A) -10 **(B)** -5 **(C)** 0 **(D)** 5 **(E)** 10

2. **Laura was at a garage sale in Crockett where she purchased six HP Prime calculators for \$25 each, eight TI-89 calculators for \$22.50 each, and a poster of Allyson Felix for \$10. The Latexo UIL team purchased all of the HP Primes for \$250, the Latexo Math department purchased all of the TI-89s for \$250, and the Latexo athletic department purchased the poster for \$50. What was her net profit?**

   (A) \$190 **(B)** \$195 **(C)** \$200 **(D)** \$205 **(E)** \$210

3. **Let a, b, c, and d be positive integers with** $a<b<c<d$**. The mean of the integers is 228, the median is 226 and the range is 36. What is the largest possible value of c?**

   (A) 233 **(B)** 236 **(C)** 239 **(D)** 242 **(E)** 245

4. **Consider** $\overline{AB}$ **with coordinates** $(0,6)$ **and** $(3,0)$**. Find the coordinates of the y-intercept of the perpendicular bisector of** $\overline{AB}$**.**

   (A) 2.25 **(B)** 2.15 **(C)** 2.05 **(D)** 1.95 **(E)** 1.85

5. **Riley leaves the LHS track at 3:00 PM and begins running toward Grapeland at a speed of 8 mph. Camryn leaves the LHS track at 3:15 PM and begins running toward Grapeland at a speed of 10 mph. At what time does Camryn catch up to Riley?**

   (A) 4:00 PM **(B)** 4:15 PM **(C)** 4:30 PM **(D)** 4:45 PM **(E)** 5:00 PM

6. **If** $6x^{2}+11x-35=(ax+b)(cx+d)$**, then** $a+b+c+d=$ _____.

   (A) 4 **(B)** 5 **(C)** 6 **(D)** 7 **(E)** 8

7. **Simplify:** $\dfrac{\left(x^{2}+x-12\right)}{\left(2x^{2}+9x+4\right)}\times\dfrac{\left(2x^{2}-x-1\right)}{\left(x^{2}+2x-3\right)}$

   (A) 1 **(B)** $\dfrac{x-1}{x+4}$ **(C)** $\dfrac{2x+1}{2x-1}$ **(D)** $\dfrac{x+4}{x-1}$ **(E)** $\dfrac{x-3}{x+3}$

8. **If** $\dfrac{x+6}{x-5}+\dfrac{x-3}{x+4}=\dfrac{ax^{2}+bx+c}{x^{2}-x-20}$**, then** $a+b+c=$ _____.

   (A) 31 **(B)** 35 **(C)** 39 **(D)** 43 **(E)** 47

9. **Find the point of intersection for the lines** $6x-y=4$ **and** $2x-y=8$**.**

   (A) $(-3,-10)$ **(B)** $(-2,-4)$ **(C)** $(-1,-10)$ **(D)** $(0,-4)$ **(E)** $(1,2)$

10. Given: $\angle ABC$ and $\angle CBE$ are supplementary angles and $\overrightarrow{BD}$ bisects $\angle CBE$. If $m\angle DBE = 32°$, $m\angle ABC =$ _____.

(A) 114° (B) 116° (C) 118° (D) 120° (E) 122°

11. Given: Triangle ABC with $AB = 12$, $BC = 16$, and $AC = 10$. Point D lies on $\overline{AC}$ where $AD = CD$. $m\angle ABD =$ _____. (nearest tenth)

(A) 16.4° (B) 17.9° (C) 19.3° (D) 20.8° (E) 22.2°

12. Given: Rhombus ABCD with AB = 10 and $m\angle ABD = 53.13°$. Find the area of the rhombus. (nearest whole number)

(A) 92 (B) 94 (C) 96 (D) 98 (E) 100

13. Given: Triangle ABC with altitude $\overline{BD}$, $m\angle BAD = 60°$, $m\angle BCA = 45°$, and $AD = 5$. Find the perimeter of triangle ABC. (nearest tenth)

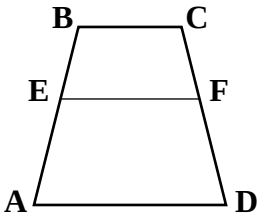
(A) 35.6 (B) 35.9 (C) 36.2 (D) 36.5 (E) 36.8

14. The Latexo State Bank is 48 ft tall and is directly across the street from Classic Chevrolet, which is 32 ft tall. The buildings are 66 ft apart. Sydnee decides to connect a cable from the roof of the bank to the roof of the car dealership. What is the minimum length of the cable? (nearest tenth)

(A) 67.9 ft (B) 68.8 ft (C) 69.7 ft (D) 70.6 ft (E) 71.5 ft

15. The point at which the three perpendicular bisectors of the sides of a triangle intersect is the _____.

(A) incenter (B) circumcenter (C) orthocenter (D) Euler point (E) centroid



BC = 12.66

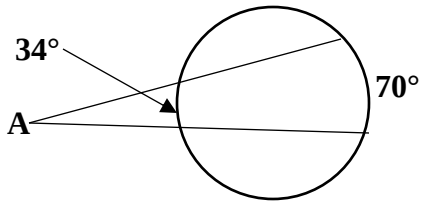
AD = 17.88

16. $\overline{EF}$ divides trapezoid ABCD into two similar trapezoids. EF = _____. (nearest hundredth)

(A) 14.82 (B) 15.05 (C) 15.20 (D) 15.27 (E) 15.49

17. Given: Triangle ABC with $m\angle B = 90°$ and point D on $\overline{AC}$ with $\overline{BD} \perp \overline{AC}$. If AC = 24 and BC = 6, then DB = _____. (nearest tenth)

(A) 5.0 (B) 5.2 (C) 5.4 (D) 5.6 (E) 5.8



18. $m\angle A =$ _____(rad). **(nearest thousandth)**

(A) 0.314 **(B) 0.463** **(C) 0.611** **(D) 0.759** **(E) 0.908**

19. $\begin{bmatrix} 1 & 2 & 3 \\ -4 & -3 & -2 \\ 3 & 4 & 5 \end{bmatrix} \times \begin{bmatrix} -1 & -2 & -3 \\ 4 & 3 & 2 \\ -3 & -4 & -5 \end{bmatrix} = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$ $c + f + i =$ _____.

(A) -28 **(B)** -24 **(C)** -20 **(D)** -16 **(E)** -12

20. Consider the expansion of $(5x-2y)^7$. **The sum of the coefficients of the** x^3y^4 **term and the** x^2y^5 **term is** _____.

(A) 50500 **(B) 51400** **(C) 52300** **(D) 53200** **(E) 54100**

21. Given: $p+q=2$ **and** $p^2+q^2=74$. $p^3+q^3=$ _____.

(A) 210 **(B) 212** **(C) 214** **(D) 216** **(E) 218**

22. The sound level, β**, in dB (decibels), is given by** $\beta = 10\log\left(\frac{I}{I_0}\right)$ **where I is the intensity of the sound measured in W/m^2, and** I_0 **is the threshold of hearing, with** $I_0 = 10^{-12}$ **W/m^2. Bishop is in the Sundown gym playing "Space Trucking" on his electric guitar at a sound level of 120 dB. Jacob, Abbigail, and Kade join him with their electric guitars. If they all play at the same intensity as Bishop, what is the sound level when all four of them play together? (nearest whole number)**

(A) 126 dB **(B) 132 dB** **(C) 138 dB** **(D) 146 dB** **(E) 152 dB**

23. Colby invested a total of $120,000 in two municipal bonds in 2019. The Muenster bond paid 6.25% annual interest compounded quarterly and the Lindsay bond paid 7.50% annual interest compounded monthly. If he earned the same amount of interest from each bond, how much did he invest in the Muenster bond?

(A) $65,728.37 **(B) $65,742.38** **(C) $65,756.39** **(D) $65,770.40** **(E) $65,784.41**

24. At the Lubbock County Fair last fall, the Westerner UIL team sponsored an apple pie contest. First place received $400, second placed received $380, third place received $360, fourth place received $340, fifth place received $320 and so on down to $20. If all the entry fees added up to $5600, how much profit did the Westerner UIL team make?

(A) $1200 **(B) $1300** **(C) $1400** **(D) $1500** **(E) $1600**

25. The vertex of a parabola is located at the point $(3, 6)$ and the equation of the directrix is y = 9. Find the point at which the focus is located.

(A) $(3, -3)$ **(B)** $(3, 0)$ **(C)** $(3, 3)$ **(D)** $(3, 12)$ **(E)** $(3, 15)$

26. Simplify: $6\sqrt{48} - 9\sqrt{27}$

(A) $-4\sqrt{3}$ **(B)** $-3\sqrt{3}$ **(C)** $-2\sqrt{3}$ **(D)** $-\sqrt{3}$ **(E)** 0

27. The line $y = \frac{1}{3}x - 3$ **intersects the parabola** $y = (x-4)^2 - 6$ **at points P and Q. Find the length of** $\overline{PQ}$**. (nearest tenth)**

(A) 3.8 **(B)** 4.0 **(C)** 4.2 **(D)** 4.4 **(E)** 4.6

28. $\csc\left(\frac{5\pi}{6}\right) + \sec\left(\frac{5\pi}{3}\right) + \cot\left(\frac{5\pi}{4}\right) =$ _____.

(A) 0 **(B)** $\sqrt{2}+1$ **(C)** $\sqrt{3}+1$ **(D)** $2\sqrt{2}+1$ **(E)** 5

29. $\text{Arcsin}\left(-\frac{1}{2}\right) + \text{Arccos}\left(-\frac{1}{2}\right) + \text{Arctan}(x) = \frac{\pi}{4}$. $x =$

(A) -2 **(B)** $-\sqrt{3}$ **(C)** -1 **(D)** $-\frac{1}{\sqrt{3}}$ **(E)** $\frac{1}{\sqrt{3}}$

30. The sequence $0, 1, 1, 2, 3, 5, 8, 13, ..., 610$ **has _____ terms.**

(A) 14 **(B)** 15 **(C)** 16 **(D)** 17 **(E)** 18

31. P and Q are the roots of $10x^2 - x - 21 = 0$. $P^2 + Q^2 + 2PQ =$ _____.

(A) $\frac{1}{120}$ **(B)** $\frac{1}{100}$ **(C)** $\frac{1}{80}$ **(D)** $\frac{1}{60}$ **(E)** $\frac{1}{40}$

32. Simplify: $\frac{\sin\theta \cdot \tan\theta}{1 - \cos\theta} - 1$

(A) $\csc\theta$ **(B)** 0 **(C)** $\cot\theta$ **(D)** -2 **(E)** $\sec\theta$

33. Find the sum of the solutions to the equation $\sin x + 1 = \cos x$ **in the interval** $(0, 2\pi)$.

(A) $\frac{3\pi}{2}$ **(B)** 2π **(C)** $\frac{5\pi}{2}$ **(D)** 3π **(E)** $\frac{7\pi}{2}$

34. Given: $\cos(\theta)=\frac{4}{5}$, where $0<\theta<\frac{\pi}{2}$, and $\sin(\alpha)=-\frac{12}{13}$, where $\pi<\alpha<\frac{3\pi}{2}$. $\cos(\theta-\alpha)=$ _____.

(A) $-\frac{56}{65}$ **(B)** $-\frac{54}{65}$ **(C)** $-\frac{52}{65}$ **(D)** $-\frac{10}{13}$ **(E)** $-\frac{48}{65}$

35. Consider the sketch of the curve represented by $x=4+3\cos t$ and $y=3+4\sin t$, $0\le t\le 2\pi$. Find the eccentricity of the curve. (nearest hundredth)

(A) 0.60 **(B) 0.63** **(C) 0.66** **(D) 0.69** **(E) 0.72**

36. Find the radius of the sphere $4x^2+4y^2+4z^2-8x+4y+12z=0$. (nearest hundredth)

(A) 1.76 **(B) 1.87** **(C) 1.98** **(D) 2.09** **(E) 2.20**

37. Given: $f''(x)=36x$, $f(1)=5$, $f(-1)=-13$. $f(2)=$ _____.

(A) 48 **(B) 50** **(C) 52** **(D) 54** **(E) 56**

38. Consider the function $f(x)=2.5x^3-2.5x^2-2.5$ There is a local minimum at (a, b) and there is a local maximum at (c, d). b + d = _____. (nearest hundredth)

(A) –5.45 **(B) –5.41** **(C) –5.37** **(D) –5.33** **(E) –5.29**

39. Find the volume of the region bounded by the graphs of $y_1=\sqrt{3-x}+2$ and $y_2=(x+6)^2+1$ revolved around the line x = 8. (nearest whole number)

(A) 856 **(B) 878** **(C) 900** **(D) 922** **(E) 944**

40. Find the slope of the line tangent to the circle $x^2+y^2=25$ at the point (4, 3).

(A) $-\frac{4}{3}$ **(B)** $-\frac{11}{9}$ **(C)** $-\frac{10}{9}$ **(D)** -1 **(E)** $-\frac{8}{9}$

41. Find the value of the derivative of $f(x)=\log_6(\cos x)$ when $x=\frac{\pi}{4}$.

(A) $-\frac{\sqrt{2}}{\ln(6)}$ **(B)** $-\frac{\ln(6)}{\sqrt{2}}$ **(C)** $-\frac{6}{\sin(6)}$ **(D)** $-\frac{1}{\ln(6)}$ **(E)** $-\ln(6)$

42. Aaron plans to fence a rectangular pasture next to the river that runs through his ranch northeast of Houston. Fencing costs $36 for every 10-foot length of fence. He does not need any fence along the river. If his pasture needs to contain 8 acres of land, what is the minimum cost of the fence for the pasture? Smith's Farm Supply only sells fencing in 10-foot lengths.

(A) $5204 **(B) $5406** **(C) $5608** **(D) $5810** **(E) $6012**

43. Evaluate $\lim_{\Delta x \to 0} \left(\dfrac{\dfrac{8}{x+\Delta x} - \dfrac{8}{x}}{\Delta x} \right)$

(A) $8\ln(x)$ **(B)** $-\dfrac{8}{x^2}$ **(C)** $\ln(8)$ **(D)** $\dfrac{4}{x^2}$ **(E)** $-\dfrac{1}{\ln(8)}$

44. Consider the sequence $\frac{3}{2}, \frac{9}{5}, \frac{27}{8}, \frac{81}{11}, \ldots$ **Find the 8th term in the sequence.**

(A) $\dfrac{6144}{17}$ **(B)** $\dfrac{6351}{20}$ **(C)** $\dfrac{6561}{23}$ **(D)** $\dfrac{6765}{26}$ **(E)** $\dfrac{6944}{29}$

45. Find the radius of convergence of $\sum_{n=0}^{\infty} 5(x-3)^n$ **.**

(A) 1 **(B) 2** **(C) 3** **(D) 4** **(E) 5**

46. Mauricio took six TMSCA mathematics tests from 2018 last week and his goal was to average at least 276 on the six tests. On his first five tests, he scored 256, 268, 274, 280, and 266. What is the lowest score he can make on test 6 that would allow him to achieve his goal?

(A) 304 **(B) 306** **(C) 308** **(D) 310** **(E) 312**

47. On the BC Calculus semester exam at Wisdom High, the mean score was an 86 with a standard deviation of 2.5. Mrs. Gonzalez will give you an A+ on her exams if your score is at least 3 standard deviations above the mean score. What was the lowest score Cecil could have made in order to receive an A+ on the semester exam?

(A) 92 **(B) 94** **(C) 96** **(D) 98** **(E) 100**

48. Dr. Jones, from the Biology Department at Anchorage University, developed a regression equation to predict the number of polar bears living in Alaska for any given year. He developed his model using data from 1980 to 2018. From this regression equation, he made a prediction for the number of polar bears that would be living in Alaska in 2050. Dr. Smith, from the Statistics Department, urged caution and pointed out that this is called _____ and such predictions are often not accurate.

(A) extrapolation **(B) correlation** **(C) confounding** **(D) transforming** **(E) mean squaring**

49. Tom has 10 blue marbles, 15 green marbles and 20 red marbles. He places all of the marbles in a jar and shakes the jar for 20 seconds. He randomly selects a marble from the jar and keeps it. He does this two more times and then looks at the three marbles he selected. Find the probability that none of the three marbles he selected are green. (nearest thousandth)

(A) 0.254 **(B) 0.286** **(C) 0.318** **(D) 0.350** **(E) 0.384**

50. Carter is playing poker with Scottie, Bethani and Asia. They are using a standard deck of 52 cards. What is the probability that Carter will be dealt a regular flush, or a straight flush, or a royal flush? A flush is 5 cards that are all of the same suit. (nearest hundred-thousandth)

(A) 0.00198 (B) 0.00226 (C) 0.00254 (D) 0.00282 (E) 0.00310

51. Reese surveyed a random sample of 217 students at MIT in order to see if their choices for the toughest class at MIT were evenly distributed. They were required to choose one from Cal III, DE II, Modern Physics, Fluid Mechanics, Astronomy II, Applied Mathematics, or Chaos Theory. He analyzed his data with a Goodness-of-Fit Test. In calculating the Chi-Square statistic and the P-value, he used _____ for the expected count for each class and _____ for the degrees of freedom.

(A) 30, 7 (B) 31, 5 (C) 31, 6 (D) 31, 7 (E) 32, 7

52. The 30 students in Mr. Williams calculus class think they can tell the difference between Coke and Pepsi. Each student was given two unlabeled cups of Coke and one unlabeled cup of Pepsi. Assume that they were just guessing and find the probability that at least 15 out of the 30 students correctly identified the cup with Pepsi in it. (nearest tenth)

(A) 3.7% (B) 4.3% (C) 4.9% (D) 5.5% (E) 6.1%

53. Assume the cholesterol level among American males between 60 and 70 years old is 220 mg/dL with a standard deviation of 15 mg/dL. The third quartile is _____ mg/dL. (nearest whole number)

(A) 228 (B) 230 (C) 232 (D) 234 (E) 236

54. The AP Statistics class at Canadian calculated the Least Squares Regression Line for shoe size and annual income of the adults living in Hemphill County. Which of the following values for the correlation r would indicate a weak linear relationship between shoe size and annual income?

(A) –0.925 (B) –0.855 (C) 0.125 (D) 0.855 (E) 0.925

55. $ABCD_{16} - DCB_{16} =$ _____$_{16}$

(A) 9B02 (B) 9C02 (C) 9D02 (D) 9E02 (E) 9F02

56. The number 53 is classified as which of the following types of numbers?

I. prime II. self III. lucky IV. polite

(A) I, II only (B) I, II, III only (C) I, II, IV only (D) I, IV only (E) I only

57. The largest prime divisor of $95! + 96!$ is _____.

(A) 79 (B) 83 (C) 89 (D) 97 (E) 101

58. Simplify: $\dfrac{14m^4n^3 - 21m^{-2}n^{-6}}{7m^{-2}n^{-6}}$

(A) $-m^3n^{-3}$ **(B)** $2m^2n^{-3} - 3$ **(C)** $2m^{-8}n^{-18} - 3m^4n^{36}$ **(D)** $2m^6n^9 - 3$ **(E)** -1

59. Express y in terms of x. $\ln y = \dfrac{1}{5}(\ln 8 + \ln x)$

(A) $y = \sqrt[5]{8 + x}$ **(B)** $y = \sqrt[5]{8x}$ **(C)** $y = \dfrac{e^{8x}}{5}$ **(D)** $y = \dfrac{e^{8+x}}{5}$ **(E)** $y = \dfrac{8x}{5}$

60. Ryan's favorite topic in BC Calculus is using a u-substitution to evaluate an integral. Here is one of his homework problems. "Evaluate $\int \dfrac{-6x^2}{(7 - 2x^3)^5}\,dx$ **." The best choice for u is _____.**

(A) $-6x^2$ **(B)** $(7 - 2x^3)^5$ **(C)** $6x^2$ **(D)** $2x^3$ **(E)** $7 - 2x^3$

2019 – 2020 TMSCA High School Mathematics Test 9
Answer Key

1. A	**21. E**	**41. D**
2. E	**22. A**	**42. E**
3. C	**23. E**	**43. B**
4. A	**24. C**	**44. C**
5. B	**25. C**	**45. A**
6. D	**26. B**	**46. E**
7. E	**27. D**	**47. B**
8. D	**28. E**	**48. A**
9. C	**29. C**	**49. B**
10. B	**30. C**	**50. A**
11. E	**31. B**	**51. C**
12. C	**32. E**	**52. B**
13. B	**33. A**	**53. B**
14. A	**34. A**	**54. C**
15. B	**35. C**	**55. D**
16. B	**36. B**	**56. C**
17. E	**37. B**	**57. D**
18. A	**38. C**	**58. D**
19. B	**39. E**	**59. B**
20. D	**40. A**	**60. E**

19-20 TMSCA HSMA Test 9 Selected Solutions

2. $(250+250+50-\big(6(25)+8(22.5)+10\big)=210$

3. $a+b+c+d=4(228)$

$b+c=452$

$d-a=36$

$a=212,\ d=248$

$b=213,\ c=239$

4. $\text{midpt}=\left(\frac{3}{2},3\right)$

$m=-2$

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

$y=\frac{1}{2}x+\frac{9}{4}$

5. $8(t+.25)=10t$

$t=1$

$4:15$

6. $(2x+7)(3x-5)$

$2+7+3-5=7$

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

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

8. $\frac{2x^2+2x+39}{x^2-x-20}$

$2+2+39=43$

9. Solve

$x=-1$

$y=-10$

10. $180-(32+32)=116°$

11. $m\angle BAD=92.86598...$

$m\angle ABD=22.2°$

12. $(10)(10)\sin(106.26°)=96$

13. $P=10+5\sqrt{6}+5+5\sqrt{3}=35.9$

14. $16^2+66^2=x^2$

$x=67.9$

15. Circumcenter

16. $\sqrt{(12.66)(17.88)}=15.05$

$6^2+x^2=24^2$

17. $x=AB=23.2379...$

$m\angle BAC=14.4775°$

$DB=5.8$

18. $m\angle A=\frac{70-34}{2}=18°\rightarrow 0.314\text{ rad}$

19. $-14+16-26=-24$

20. $70000-16800=53200$

21. $p=7,\ q=-5$

$7^3+(-5)^3=218$

22. $120=10\log\left(\frac{I}{10^{-12}}\right)$

$I=1$

$\beta=10\log\left(\frac{4\cdot 1}{10^{-12}}\right)=126\text{ dB}$

23. $x-x\left(1+\frac{.-625}{4}\right)^4=(120000-x)-(120000-x)\left(1+\frac{.075}{12}\right)^{12}$

$x=\$65,784.41$

24. $\sum_{n=1}^{20}20n=4200$

$5600-4200=\$1400$

25. $p=9-6=3$

$6-3=3$

$(3,3)$

26. TI

$-3\sqrt{3}$

27. $x_1=2.0783393,\ y_1=-2.30722$

$x_2=6.254994,\ y_2=-.915002$

$d=\sqrt{(x_2-x_1)+(y_2-y_1)}=4.4$

28. $2+2+1=5$

$$-\frac{\pi}{6}+\frac{2\pi}{3}+?=\frac{\pi}{4}$$

29. $?=-\frac{\pi}{4}$

$$\tan\left(-\frac{\pi}{4}\right)=-1$$

30. $F_{15}=610$

$15+1=16$

31. $(P+Q)^2=\left(\frac{1}{10}\right)^2=\frac{1}{100}$

$$\frac{\sin x\sin x}{\cos x(1-\cos x)}-1$$

32. $$\frac{\sin^2 x}{\cos x(1-\cos x)}-1$$

$$\frac{(1-\cos x)(1+\cos x)}{\cos x(1-\cos x)}-1$$

$$\frac{1+\cos x-\cos x}{\cos x}=\frac{1}{\cos x}=\sec x$$

one zero

33. $\frac{3\pi}{2}$

$\theta=36.869...$

34. $\alpha=247.3801...$

$\cos(\theta-\alpha)=-\frac{56}{65}$

$$\cos t=\frac{x-4}{3},\ \sin t=\frac{y-3}{4}$$

35. $$\frac{(x-4)^2}{9}+\frac{(y-3)^2}{16}=1$$

$16=9+c^2,\ c=\sqrt{7}$

$e=\frac{\sqrt{7}}{4}=.66$

$$4(x^2-2x+1)+4(y^2+y+.25)+4(z^2+3z+2.25)=0+4+1+9$$

36. $(x-1)^2+(y+.5)^2+(z+1.5)^2=3.5$

$r=\sqrt{3.5}=1.87$

$$f'=18x^2+c$$

$$f=6x^3+cx+d$$

37. $5=6+c+d$

$-13=-6-c+d$

$f(x)=6x^3+3x-4$

$f(2)=50$

TI

38. $b=-2.87037$

$d=-2.5$

$a+b=-5.37$

39. $2\pi\int_{-8.080564}^{-4.086339}(8-x)(y_1-y_2)dx=944$

$$f=\frac{\ln(\cos x)}{\ln 6}$$

40. $\frac{dy}{dx}=-\frac{x}{y}=-\frac{4}{3}$

41. $f'=\frac{1}{\ln(6)\cdot\cos x}\cdot(-\sin x)$

$$f'\left(\frac{\pi}{4}\right)=\frac{-\tan\left(\frac{\pi}{4}\right)}{\ln(6)}=-\frac{1}{\ln(6)}$$

$$xy=\frac{8(5280)^2}{640}=348480$$

$$P=2x+y=2x+\frac{348480}{x}$$

42. $P'=0,\ x=417.42...$

$P=1669.68...$

$n=\frac{1670}{10}(36)=\$6012$

43. $\frac{d}{dx}\left(\frac{8}{x}\right) = -\frac{8}{x^2}$

44. $\frac{3^8}{2+7(3)} = \frac{6561}{23}$

45. $\lim_{n\to 0}\left|\frac{5(x-3)^{n+1}}{5(x-3)^n}\right|$

$|x-3|<1$

centered at $x=3$

$R=1$

46. $\frac{256+268+274+280+266+x}{6} = 276$

$x = 312$

47. $86+3(2.5) = 93.5$

94

48. When you make a prediction beyond the original observation range - extrapolation

49. $\frac{30}{45}\cdot\frac{29}{44}\cdot\frac{28}{43} = 0.286$

50. $\frac{{}_4C_1 \cdot {}_{13}C_5}{{}_{52}C_5} = .00198$

51. $\frac{217}{7} = 31$

$df = 7-1 = 6$

52. $\text{binomialCdf}\left(30, \frac{1}{3}, 15, 30\right) = .04348$

4.3%

53. Inverse Normal

Area = .75

$\mu = 220$

$\sigma = 15$

230.117

54. Values close to zero

55. 9E02

56. prime

self

polite

57. $95+2=97$

58. $2m^6n^9-3$

59. $\ln y = \ln(8x)^{\frac{1}{5}}$

$y = \sqrt[5]{8x}$

60. $u = 7-2x^3$