

TI-83/84 Calculator Exam - Key

1. Find the least common multiple of 6664 and 4760.

Answer:	33,320
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2. Give the prime factorization of 180,047.

Answer:	$(7)(17)^2(89)$
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3. Let $a_n = n^2 - n + 1$ for each natural number n . Compute the average of the numbers $a_1, a_2, a_3, \dots, a_{50}$.

Answer:	834
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4. Let $f(x) = 1 + x(2 - x(3 - x(4 - x(1 + x))))$. Compute $f(f(f(f(0))))$.

Answer:	6,106,202
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5. Round the number $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \dots - \frac{1}{100}$ to 8 decimal places.

Answer:	0.68817218
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6. Find the smallest integer n for which $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{n} > 7$.

Answer:	616
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7. Round the number $\left(\frac{1}{1+1}\right)\left(\frac{4}{4+1}\right)\left(\frac{9}{9+1}\right)\left(\frac{16}{16+1}\right)\dots\left(\frac{10,000}{10,000+1}\right)$ to 8 decimal places.

Answer:	0.27474926
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8. Solve the system $\begin{cases} 62x - 41y = 6 \\ 19x + 27y = 22 \end{cases}$. Give the values for x and y in fraction form.

Answer:	$\{x = \frac{1064}{2453}, y = \frac{1250}{2453}\}$
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9. Give the minimum value of the function $(x-1)(x-2)(x-3)(x-5)$ for $0 \leq x \leq 5$. Round the answer to 8 decimal places.

Answer:	-6.91409679
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10. Give the number of solutions to the equation $(x-1)(x-2)(x-3)(x-5) = \frac{1}{x} - 5$.

Answer:	3
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11. Sum the solutions to the equation $x^3 - 6x^2 + 11x = 6.1$, and give the value rounded to 8 decimal places.

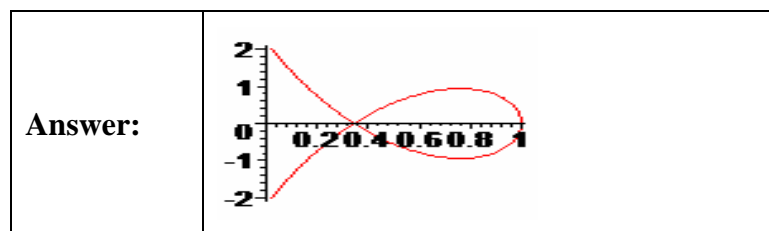
Answer:	6
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12. Factor the polynomial $x^6 - 6x^5 + 6x^4 + 16x^3 - 15x^2 - 18x$.

Answer:	$x(x-2)(x+1)^2(x-3)^2$
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13. What symbol appears when you graph the parametric equations

$$x = 1 - \frac{t^2}{2} + \frac{t^4}{24}, y = 2t - \frac{4t^3}{3} \text{ for } -\frac{\pi}{2} \leq t \leq \frac{\pi}{2}?$$



14. Find the smallest positive integer x for which $x2^{\sqrt{x}} > 10,000$.

Answer:	56
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15. Suppose that, beginning on February 1, 2005, you put \$100 in the bank on the first day of every month and that the account earns 0.2% interest on the last day of every month. How much money will be in the account on June 30, 2010?

Answer:	\$113.86 or \$113.87
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16. A series of calculations must be performed for each of the values in the first column of the table below. Each value must be added to 12% of its original value. Then the new value must be divided by one more than the original amount, and the result must be squared. This final value should be entered in the second column, and the sum of the 1000 values in the second column should be recorded in the given blank (rounded to 8 decimal places). What value is recorded in the blank for the sum?

1	
2	
:	
1000	
Sum:	1238.93449718 (they might have trouble with this much accuracy)

17. Every integer between 1500 and 2000 is assigned a value as follows: If the number is divisible by 2, 3 or 7 and the number is not a perfect square, then the value -31 is assigned. If the number is divisible by 2, 3 or 7 and the number is a perfect square, then the value -10 is assigned. Otherwise, the value 2 is assigned. Give the sum of the assigned values.

Answer:	-10,728
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18. Solve the inequality $||x - 4| - 11| - 7| < 2$.

Answer:	$-16 < x < -12$ or $-2 < x < 2$ or $6 < x < 10$ or $20 < x < 24$
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19. One thousand lockers are mounted side-by-side down a long hallway with the numbers 1 through 1000 written on the lockers. All of the locker doors are currently closed. One hundred students walk down the hallway in single file. The first student opens all of the locker doors. The second student closes the locker doors with even numbers on them. The third student changes the state of the locker doors 3, 6, 9, ... That is, she opens a locker door if it is currently closed, and closes it if it is currently open. The fourth student changes the state of the locker doors 4, 8, 12, ..., and the fifth, sixth, seventh, ... students act similarly. What is the state of the locker doors numbered 718 through 725 when the students are done? Write the words “opened” or “closed” in the table below to give your answers.

718	Closed
719	Open
720	Closed
721	Closed
722	Closed
723	Closed
724	Closed
725	Open

20. A calculator does not store square root values. Instead, it uses an algorithm to compute them when they are requested. If a is a positive number, then one such algorithm for approximating \sqrt{a} uses the function $g(x) = \frac{x}{2} + \frac{a}{2x}$ to create the values $x_1 = g(a)$, $x_2 = g(x_1)$, $x_3 = g(x_2)$, etc. This process is stopped when $|x_n - x_{n-1}| < 10^{-8}$. Record the value of n and the approximate $x_n \approx \sqrt{a}$ (from your calculator) for each value of a in the table below.

a	n	x_n
2	5	1.414213562
3	5	1.732050808
4	6	2.0
5	6	2.236067977
6	6	2.449489744

21. Determine the number of fractions in reduced form m/n where m and n are integers between 1 and 20, and $m < n$.

Answer:	27
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22. **Tie-Breaker.** A deck has 50 playing cards, and each card has one of the numbers 1, 2, 3, 4 or 5 written on it. There are 10 of each card type. The deck is shuffled and the cards are laid out on a table as shown below (the numbers in the picture are only there for illustration...there are many other possible configurations). The cards are considered in order from top left to bottom right. A person randomly chooses one of the first 5 cards, reads the number on the card, and then moves forward through the cards an amount given by this number. Then they read the number on the new card (the one they land on) and move forward again, using the new number. This process continues until it is no longer possible to move (for example, it is not possible to move forward 3 from the last 3 in the table below), and the last card is recorded. Notice that if this process is performed on the cards below, then the result is the same, regardless of where the person starts. Simulate the general process on your calculator to approximate the probability that that this occurs whenever the cards are shuffled and dealt. (Note: In the event of a tie, the answer closest to the actual answer will be considered “most correct”, so guessing is an option 😊.)

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

Answer:	.9982
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