Zetta

TMUA Mock Paper 1

20 questions 75 minutes

No calculator. Answer key at the end. **About this copy**

This PDF was typeset from the freely accessible Zetta paper on Attempt TMUA Lab. It includes all 20 questions, answer choices, four source diagrams and the published answer key. It is a recreated practice copy, not the original PDF download. The website's wording and option labels are retained.

Original question author: Zetta.

Source: https://attemptlearning.com/tmua/papers/community-zetta-1

Prepared 16 September 2026.

Question 1

Given that

$$\int_1^a (ax+2)\,\mathrm{d}x = \frac{5\sqrt{2}}{2} - 2$$

Find the value of a

A. 2

B. $\sqrt{2}$

C. $\sqrt{2}+1$

D. $\sqrt{2}-1$

E. 1.5

Question 2

Given that the points $(-2, 0)$, $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ and $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$ all lie on the circle C with radius r and centre $(a, 0)$.

Find $r - a$.

A. 1

B. $1 - \sqrt{2}$

C. 2

D. $3 + \sqrt{3}$

E. 3

Question 3

What are the solution(s) to

$$\ln(x^2 + 4x - 90) = \ln(-2x + 1)$$

for all real x?

A. $13, 7$

B. $-13, 7$

C. $-13, -7$

D. -13

E. 7

Question 4

You are given that

$$p(x) = -6 + x + x^2 + x^3 + x^4 + x^5 + \cdots .$$

Find the value of x such that $p(x) = 0$.

A. $-\frac{1}{7}$

B. $-\frac{1}{6}$

C. $\frac{8}{7}$

D. $\frac{1}{7}$

E. $\frac{6}{7}$

Question 5

After Euclid High School's last basketball game, it was determined that $\frac{1}{4}$ of the team's points were scored by Alexa and $\frac{2}{7}$ were scored by Brittany. Chelsea scored 15 points. None of the other 7 team members scored more than 2 points. What was the total number of points scored by the other 7 team members?

A. 10

B. 11

C. 12

D. 13

E. 14

Question 6

Evaluate

$$\sum_{n=1}^{6000} \frac{1}{n(n+1)}.$$

A. $\frac{6000}{6001}$

B. $\frac{6001}{6000}$

C. $\frac{5999}{6000}$

D. $\frac{6000}{5999}$

E. $\frac{5999}{6001}$

Question 7

Let $A(n)$ be the area of a regular polygon with n sides, each of length 1, where $n \geq 3$. Find, in terms of n, an expression for

$$\frac{A(n)}{A(n+1)}$$

[Angles in degrees]

A. $\dfrac{(n+1)\tan\left(90 - \frac{180}{n+1}\right)}{n\tan\left(90 - \frac{180}{n}\right)}$

B. $\dfrac{n\tan\left(90 - \frac{180}{n}\right)}{(n+1)\tan\left(90 - \frac{180}{n+1}\right)}$

C. $\dfrac{n\tan\left(180 - \frac{360}{n}\right)}{(n+1)\tan\left(180 - \frac{360}{n+1}\right)}$

D. $\dfrac{4n\tan\left(180 - \frac{360}{4n}\right)}{(n+1)\tan\left(180 - \frac{360}{n+1}\right)}$

E. $\dfrac{n\tan\left(\frac{180}{n}\right)}{(n+1)\tan\left(\frac{180}{n+1}\right)}$

F. $\dfrac{n\tan\left(180 - \frac{360}{n}\right)}{n\tan\left(90 - \frac{180}{n}\right)}$

Question 8

Which of the following expressions is closest to the value of

$$\sqrt{100001} - \sqrt{100000}?$$

A. $\frac{1}{\sqrt{100000}}$

B. $\frac{1}{2\sqrt{100000}}$

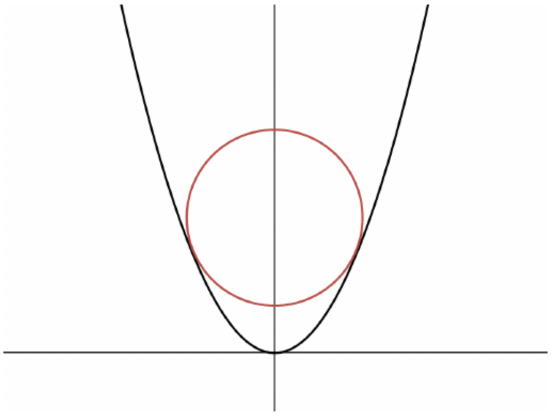
C. $\frac{1}{10\sqrt{100000}}$

D. $\frac{1}{100\sqrt{100000}}$

E. $\frac{1}{100000\sqrt{100000}}$

Question 9

A circle of radius r is dropped into the curve $y = x^2$ such that it only touches the curve. The circle's centre is $(0, c)$. Express c in terms of r.



A. $\frac{1+2r^2}{2}$

B. $\frac{1-4r^2}{4}$

C. $\frac{4r}{r^2-2}$

D. $\frac{r^2}{4} - 1$

E. $\frac{1+4r^2}{4}$

F. $\frac{1-6r^2}{2}$

G. $\frac{r^3-r}{4}$

Question 10

Simplify

$$\sqrt{3 - 2\sqrt{2}}.$$

A. $\sqrt{2}$

B. $2 + \sqrt{2}$

C. $\sqrt{2} - 1$

D. $2 - \sqrt{2}$

E. $1 - \sqrt{2}$

F. $\frac{\sqrt{2}}{2} + \frac{1}{2}$

G. $3 - 3\sqrt{2}$

Question 11

Given that $a \neq d \neq 0$ and that

$$\frac{a^2 - 2a + d^2}{2d + 2ad - 1} = 1,$$

what is the value of $a + d$?

A. 1

B. 2

C. 3

D. 4

E. $\sqrt{2}$

F. $\frac{1}{2}$

G. -1

Question 12

Xander rolls 3 fair six-sided dice. Given that at least 2 of them show a 3, what is the probability that the third also shows a 3?

A. $\frac{3}{8}$

B. $\frac{3}{18}$

C. $\frac{1}{3}$

D. $\frac{1}{18}$

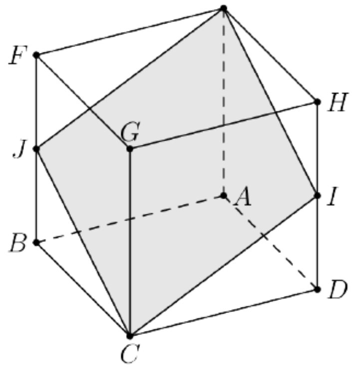
E. $\frac{1}{6}$

F. $\frac{1}{2}$

G. $\frac{1}{16}$

Question 13

In the cube $ABCDEFGH$ with opposite vertices C and E, J and I are the midpoints of segments FB and HD, respectively. Let R be the ratio of the area of the cross-section $EJCI$ to the area of one of the faces of the cube. What is R^2?



A. $\frac{5}{4}$

B. $\frac{4}{3}$

C. $\frac{3}{2}$

D. $\frac{25}{16}$

E. $\frac{9}{4}$

F. $\frac{7}{4}$

Question 14

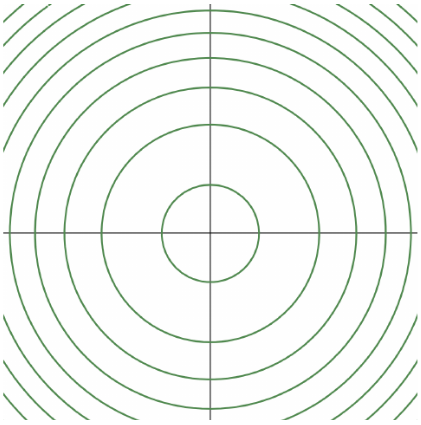
The graph of $\tan(x^2 + y^2) = 1$ is shown below (angles in radians).

The graph consists of a central circle surrounded by infinitely many annuluses or rings.

The central circle has area C and each annulus has the same constant area A.

What is $\frac{A}{C}$?

[An annulus is the region between two concentric circles (like a ring)]



A. 4

B. $\frac{1}{2}$

C. π^2

D. $\frac{3}{4\pi}$

E. $\frac{\pi^2+1}{4\pi}$

F. $\frac{1}{\pi}$

Question 15

Given that x is in radians, write

$$\sin(2\arctan(x))$$

without using trigonometric functions.

A. $\frac{1}{\sqrt{1+x^2}}$

B. $\frac{1+x^2}{\sqrt{2x}}$

C. $\frac{x}{\sqrt{1+x^2}}$

D. $\frac{2x}{1+x^2}$

E. $\frac{1}{\sqrt{2x}}$

F. $\frac{2x}{1-x^2}$

Question 16

a, b and c are positive integers so that

$$\frac{\frac{a}{c}+\frac{a}{b}+1}{\frac{b}{a}+\frac{b}{c}+1}=17.$$

How many solutions are there to the inequality

$$a+2b+3c\leq 50?$$

A. 14

B. 15

C. 16

D. 17

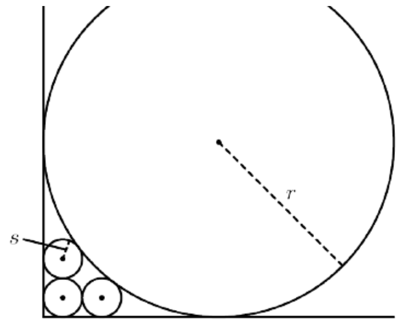
E. 18

F. 19

G. 0

Question 17

Three circles of radius s are drawn in the first quadrant of the xy-plane. The first circle is tangent to both axes, the second is tangent to the first circle and the x-axis, and the third is tangent to the first circle and the y-axis. A circle of radius $r > s$ is tangent to both axes and to the second and third circles. What is r/s?



5

A. 5

B. 6

C. 8

D. 9

E. 10

F. 12

Question 18

Let S be the set of all points with coordinates (x, y, z), where x, y, and z are each chosen from the set $\{0, 1, 2\}$. How many equilateral triangles all have their vertices in S?

A. 72

B. 80

C. 86

D. 94

E. 96

F. 102

Question 19

Find the number of integer values of k in the range $-500 \leq k \leq 500$ for which the equation $\log(kx) = 2\log(x+2)$ has exactly one real solution.

A. 499

B. 500

C. 501

D. 502

Question 20

Given that

$$f(x) = x^{2008} - 2x^{2007} + 3x^{2006} - 4x^{2005} + \cdots + 2007x^2 - 2008x + 2009$$

and that

$$g(x) = \frac{2012x + 2009}{1 + x^2},$$

which of the following is a solution to $g(x) = f(x)$?

A. 1

B. $2^{1/2009}$

C. $3^{1/2009}$

D. $4^{1/2009}$

E. $2^{1/2008}$

F. $3^{1/2008}$

G. $4^{1/2008}$

Answer key

Published answer key, reproduced from the source. These are answers, not worked solutions.

Question	Answer	Question	Answer
1	B	11	B
2	C	12	G
3	D	13	C
4	E	14	A
5	B	15	D
6	A	16	A
7	B	17	D
8	B	18	B
9	E	19	C
10	C	20	B

This is a difficult, unofficial community paper. The original author notes that errors may occur.