

PreCalculus — 100 Essential Problems

COMPLETE REVIEW · ALL UNITS

Name: _____ Date: _____ Score: _____ / 100

FUNCTIONS & GRAPHS

#1

EASY

Which of the following represents the domain of $f(x) = \sqrt{x - 3}$?

$$f(x) = \sqrt{x - 3}$$

A $x > 3$

B $x \geq 0$

C $x \geq 3$

D $x \leq 3$

#2

EASY

If $f(x) = 2x + 5$, what is $f(-1)$?

$$f(x) = 2x + 5$$

A 3

B 7

C -3

D -7

#3

EASY

Which test determines if a graph represents a function?

A Horizontal Line Test

B Vertical Line Test

C Zero Test

D Symmetry Test

#4

EASY

Find the x-intercept of $f(x) = 3x - 9$.

$$f(x) = 3x - 9$$

A $x = 3$

B $x = -3$

C $x = 9$

D $x = 0$

#5

EASY

What is the range of $f(x) = x^2$?

$$f(x) = x^2$$

A All real numbers

B $y \geq 0$

C $y > 0$

D $y \leq 0$

#6

EASY

If $g(x) = x^2 - 4$, find $g(0)$.

$$g(x) = x^2 - 4$$

A 0

B -4

C 4

D 2

#7

EASY

Which function is even?

A $f(x) = x^3$ B $f(x) = x^2 + 1$ C $f(x) = x + 2$ D $f(x) = \sqrt{x}$

#8

EASY

The graph of $y = f(x) + 3$ is a vertical shift of $f(x)$ by:

A 3 units down

B 3 units right

C 3 units up

D 3 units left

#75

MEDIUM

If $f(x) = x^2$ and $g(x) = x + 1$, find $(f \circ g)(2)$.

$$(f \circ g)(2) = f(g(2))$$

A 5

B 9

C 6

D 25

#76

MEDIUM

Find the inverse of $f(x) = 2x - 6$.

$$f(x) = 2x - 6$$

A $f^{-1}(x) = (x+6)/2$ B $f^{-1}(x) = 2x+6$ C $f^{-1}(x) = x/2 - 6$ D $f^{-1}(x) = (x-6)/2$

#95

HARD

Which of the following is a one-to-one function?

A $f(x) = x^2$ B $f(x) = |x|$ C $f(x) = 2^x$ D $f(x) = \sin(x)$

#96

HARD

If $f(x) = (x+1)/(x-1)$, find $f^{-1}(x)$.

$$f(x) = (x+1)/(x-1)$$

A $f^{-1}(x) = (x+1)/(x-1)$

B $f^{-1}(x) = (x-1)/(x+1)$

C $f^{-1}(x) = (1+x)/(1-x)$

D $f^{-1}(x) = x$

#105

HARD

Which transformation describes $y = f(-x)$?

$$y = f(-x)$$

A Reflection over x-axis

B Reflection over y-axis

C Vertical stretch

D Horizontal stretch

#114

HARD

Determine if $f(x) = x^3 - x$ is odd, even, or neither.

$$f(x) = x^3 - x$$

A Even

B Neither

C Odd

D Periodic

POLYNOMIALS

#9

EASY

What is the degree of the polynomial $p(x) = 4x^3 - 2x^2 + x - 7$?

$$p(x) = 4x^3 - 2x^2 + x - 7$$

A 1

B 2

C 3

D 4

#10

EASY

Factor completely: $x^2 - 9$.

$$x^2 - 9$$

A $(x-3)^2$

B $(x+3)(x-3)$

C $(x+9)(x-1)$

D $(x-3)(x+1)$

#11

EASY

Which is a zero of $p(x) = x^2 - 5x + 6$?

$$p(x) = x^2 - 5x + 6$$

A $x = 1$

B $x = 2$

C $x = 4$

D $x = 6$

#12

EASY

Expand $(x + 4)^2$.

$$(x + 4)^2$$

A $x^2 + 16$

B $x^2 + 8x + 16$

C $x^2 + 4x + 16$

D $x^2 + 8x + 8$

#13

MEDIUM

Divide $x^3 - 8$ by $(x - 2)$ using synthetic division. The quotient is:

$$(x^3 - 8) \div (x - 2)$$

A $x^2 + 2x + 4$

B $x^2 - 2x + 4$

C $x^2 + 4$

D $x^2 - 4$

#14

MEDIUM

By the Rational Root Theorem, which could be a rational root of $2x^3 - 3x + 1$?

$$2x^3 - 3x + 1$$

A ± 3

B $\pm 1/2$

C $\pm 2/3$

D ± 4

#15

MEDIUM

How many positive real zeros can $p(x) = x^4 - 3x^2 + 2$ have? (Descartes' Rule)

$$p(x) = x^4 - 3x^2 + 2$$

A Exactly 1

B Exactly 3

C 2 or 0

D 4 or 2

#16

MEDIUM

What is the end behavior of $f(x) = -2x^3 + 5x$?

$$f(x) = -2x^3 + 5x$$

A Up left, up right

B Down left, down right

C Up left, down right

D Down left, up right

#77

HARD

Find all real zeros of $p(x) = x^3 - 6x^2 + 11x - 6$.

$$p(x) = x^3 - 6x^2 + 11x - 6$$

A $x = 1, 2, 3$

B $x = 1, -2, 3$

C $x = -1, 2, -3$

D $x = 2, 3, 6$

#78

HARD

The polynomial with zeros $x = 1$, $x = -2$ (multiplicity 2) and leading coeff 1 is:

zeros: 1, -2 (mult. 2)

A $(x-1)(x+2)^2$

B $(x+1)(x-2)^2$

C $x^3 - 5x + 4$

D $(x+1)(x+2)^2$

#90

HARD

Use the Factor Theorem: is $(x - 2)$ a factor of $p(x) = x^3 - 4x^2 + x + 6$?

$$p(x) = x^3 - 4x^2 + x + 6$$

A Yes, because $p(2)=0$

B No, because $p(2) \neq 0$

C Yes, because $p(-2)=0$

D Cannot determine

#113

HARD

Complex zeros of $x^2 + 4$ are:

$$x^2 + 4 = 0$$

A $x = \pm 2$

B $x = \pm 2i$

C $x = \pm 4i$

D $x = \pm\sqrt{2}$

RATIONAL FUNCTIONS

#17

EASY

Find the vertical asymptote of $f(x) = 1/(x - 5)$.

$$f(x) = 1/(x - 5)$$

A $y = 5$

B $x = 5$

C $x = -5$

D $y = 0$

#18

EASY

What is the horizontal asymptote of $f(x) = 3x/(x + 2)$?

$$f(x) = 3x/(x + 2)$$

A $y = 3$

B $y = 0$

C $y = 2$

D No HA

#19

MEDIUM

Simplify: $(x^2 - 4)/(x - 2)$.

$$(x^2 - 4)/(x - 2), x \neq 2$$

A $x + 2$

B $x - 2$

C $x^2 + 2$

D 2

#20

MEDIUM

Solve: $\frac{1}{x} + \frac{1}{3} = \frac{5}{6}$.

$$\frac{1}{x} + \frac{1}{3} = \frac{5}{6}$$

A $x = 2$

B $x = 6$

C $x = 3$

D $x = -2$

#21

MEDIUM

For $f(x) = \frac{(x^2 - 1)}{(x - 1)}$, what is the behavior at $x = 1$?

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

A Vertical asymptote

B Removable hole at (1, 2)

C Zero at $x = 1$

D HA at $y = 1$

#91

HARD

For $f(x) = (2x^2 + 1)/(x - 3)$, as $x \rightarrow \infty$, $f(x)$ behaves like:

$$f(x) = (2x^2 + 1)/(x - 3)$$

A $y = 2x$

B $y = 2$

C $y = x$

D $y \rightarrow \infty$ with no asymptote

#106

HARD

The oblique asymptote of $f(x) = (x^2 + 2x - 1)/(x + 1)$ is:

$$f(x) = (x^2 + 2x - 1)/(x + 1)$$

A $y = x + 1$

B $y = x - 1$

C $y = x$

D $y = 2x$

#119

HARD

Solve: $(x + 1)/(x - 2) > 0$.

$$(x+1)/(x-2) > 0$$

A $x < -1$ or $x > 2$

B $-1 < x < 2$

C $x > 2$

D $x < -1$

EXPONENTIAL & LOGARITHMIC

#22

EASY

Evaluate $\log_2(32)$.

$$\log_2(32)$$

A 3

B 4

C 5

D 6

#23

EASY

Simplify $\ln(e^3)$.

$$\ln(e^3)$$

A $3e$

B e^3

C 3

D $1/3$

#24

EASY

Which equation is equivalent to $\log_3(x) = 4$?

$$\log_3(x) = 4$$

A $x = 3^4$

B $x = 4^3$

C $3 = x^4$

D $4 = 3x$

#25

EASY

Expand $\log(x^2y)$ using log properties.

$$\log(x^2y)$$

A $2\log(x) + \log(y)$

B $\log(x^2) \cdot \log(y)$

C $\log(2x) + \log(y)$

D $2\log(x) - \log(y)$

#26

MEDIUM

Solve: $2^x = 16$.

$$2^x = 16$$

A $x = 2$

B $x = 4$

C $x = 8$

D $x = 3$

#27

MEDIUM

Solve: $\log(x) + \log(x - 3) = 1$. (base 10)

$$\log(x) + \log(x - 3) = 1$$

A $x = 5$

B $x = 2$

C $x = -2$

D $x = 10$

#28

MEDIUM

The number e is approximately:

A 2.718

B 3.141

C 1.414

D 1.732

#29

MEDIUM

Use Change of Base: $\log_5(20) = ?$

$$\log_5(20)$$

A $\ln(5)/\ln(20)$

B $\log(20)/\log(5)$

C $\log(5)/\log(20)$

D $5 \cdot \log(20)$

#79

HARD

Solve: $3^{(2x)} = 81$.

$$3^{(2x)} = 81$$

A $x = 2$

B $x = 4$

C $x = 3$

D $x = 1/2$

#80

HARD

Condense: $2\ln(x) - \ln(y)$ into a single logarithm.

$$2\ln(x) - \ln(y)$$

A $\ln(2x-y)$

B $\ln(x^2/y)$

C $\ln(x^2) - \ln(y)$

D $\ln(2x/y)$

#94

HARD

Population doubles every 5 years. Starting at 1000, how many after 15 years?

$$P = 1000 \cdot 2^{(t/5)}, \quad t=15$$

A 3000

B 8000

C 6000

D 4000

#103

HARD

Solve: $\ln(x+1) - \ln(x-1) = 2$.

$$\ln(x+1) - \ln(x-1) = 2$$

A $x = (e^2+1)/(e^2-1)$ B $x = e^2/(e^2-1)$ C $x = (e+1)/(e-1)$ D $x = e$

#115

HARD

Evaluate $\log_4(1/16)$.

$$\log_4 (1/16)$$

A -2

B 2

C 4

D -4

TRIGONOMETRY — BASICS

#30

EASY

Convert 180° to radians.

$$180^\circ \rightarrow \text{radians}$$

A $\pi/2$

B π

C 2π

D $\pi/4$

#31

EASY

What is $\sin(90^\circ)$?

$\sin(90^\circ)$

A 0

B 1

C -1

D $\sqrt{2}/2$

#32

EASY

What is $\cos(0^\circ)$?

$\cos(0^\circ)$

A 0

B -1

C 1

D $\sqrt{3}/2$

#33

EASY

Which quadrant has $\sin > 0$ and $\cos < 0$?

A Quadrant I

B Quadrant II

C Quadrant III

D Quadrant IV

#34

EASY

Find $\tan(45^\circ)$.

$$\tan(45^\circ)$$

A 0

B 1

C $\sqrt{3}$

D $\sqrt{2}/2$

#35

EASY

What is the period of $y = \sin(x)$?

$$y = \sin(x)$$

A π

B 2π

C $\pi/2$

D 4π

#36

EASY

The reciprocal of $\sin(\theta)$ is:

A $\cos(\theta)$

B $\tan(\theta)$

C $\csc(\theta)$

D $\sec(\theta)$

#37

MEDIUM

Find $\sin(\pi/6)$.

$$\sin(\pi/6)$$

A $\sqrt{3}/2$

B $1/2$

C $\sqrt{2}/2$

D 1

#38

MEDIUM

Which identity is the Pythagorean Identity?

A $\sin^2\theta + \cos^2\theta = 1$

B $\sin^2\theta - \cos^2\theta = 1$

C $\sin\theta \cdot \cos\theta = 1$

D $\tan\theta = \sin\theta + \cos\theta$

#81

HARD

If $\sin(\theta) = 3/5$ and θ is in Quadrant II, find $\cos(\theta)$.

$$\sin(\theta) = 3/5, \text{ QII}$$

A $4/5$

B $-4/5$

C $3/4$

D $-3/4$

#92

HARD

Find all solutions in $[0, 2\pi)$: $2\cos(\theta) = \sqrt{3}$.

$$2\cos(\theta) = \sqrt{3}$$

A $\pi/6$ and $11\pi/6$

B $\pi/3$ and $5\pi/3$

C $\pi/6$ and $5\pi/6$

D $\pi/3$ and $2\pi/3$

#99

HARD

Solve $2\sin^2\theta - \sin(\theta) - 1 = 0$ for $\theta \in [0^\circ, 360^\circ)$.

$$2\sin^2\theta - \sin\theta - 1 = 0$$

A $30^\circ, 270^\circ$

B $90^\circ, 210^\circ, 330^\circ$

C $90^\circ, 150^\circ$

D $210^\circ, 330^\circ$

#104

HARD

In a right triangle, opposite = 5, adjacent = 12. What is $\tan(\theta)$?

opp = 5, adj = 12

A 5/12

B 12/5

C 5/13

D 12/13

#116

HARD

Find a coterminal angle (0° to 360°) for -150° .

-150°

A 210°

B 150°

C 30°

D 330°

#39

EASY

What is the amplitude of $y = 3\sin(x)$?

$$y = 3\sin(x)$$

A 3

B 6

C π

D $1/3$

#40

EASY

What is the period of $y = \sin(2x)$?

$$y = \sin(2x)$$

A π

B 2π

C 4π

D $\pi/2$

#41

MEDIUM

Identify the phase shift of $y = \sin(x - \pi/4)$.

$$y = \sin(x - \pi/4)$$

A $\pi/4$ left

B $\pi/4$ right

C $\pi/2$ right

D $-\pi/4$

#42

MEDIUM

What is the vertical asymptote of $y = \tan(x)$ closest to $x = 0$ ($x > 0$)?

$$y = \tan(x)$$

A $x = \pi$

B $x = \pi/2$

C $x = \pi/4$

D $x = 2\pi$

#43

MEDIUM

For $y = 2\cos(x) + 1$, the midline is:

$$y = 2\cos(x) + 1$$

A $y = 0$

B $y = 2$

C $y = 1$

D $y = -1$

#83

HARD

Write an equation for a sine function: amplitude 3, period 4π , no shift.

$$A=3, \text{ period}=4\pi$$

A $y = 3\sin(x/2)$

B $y = 3\sin(2x)$

C $y = 3\sin(4\pi x)$

D $y = 3\sin(x)$

#112

HARD

Determine the range of $y = 3\sin(x) + 2$.

$$y = 3\sin(x) + 2$$

A $[-1, 5]$

B $[-3, 3]$

C $[2, 5]$

D $[-3+2, 3+2]$

TRIG IDENTITIES

#44

MEDIUM

Simplify: $\sin^2\theta + \cos^2\theta + \tan^2\theta$.

$$\sin^2\theta + \cos^2\theta + \tan^2\theta$$

A $1 + \tan^2\theta$

B $\sec^2\theta$

C 1

D 2

#45

MEDIUM

Simplify: $(1 - \cos^2\theta)/\sin^2\theta$.

$$(1 - \cos^2\theta)/\sin^2\theta$$

A 0

B 1

C $\tan^2\theta$

D $\cos^2\theta$

#46

MEDIUM

Which is the double angle formula for $\sin(2\theta)$?

$$\sin(2\theta) = ?$$

A $2\sin\theta$

B $2\sin\theta\cos\theta$

C $\sin^2\theta - \cos^2\theta$

D $2\cos^2\theta - 1$

#47

MEDIUM

$\cos(2\theta)$ equals:

$$\cos(2\theta)$$

A $2\cos^2\theta - 1$

B $2\sin\theta\cos\theta$

C $1 - \sin^2\theta$

D $\cos^2\theta - 1$

#48

HARD

Simplify: $(\sin\theta + \cos\theta)^2 - 1$.

$$(\sin\theta + \cos\theta)^2 - 1$$

A $2\sin\theta\cos\theta$

B 1

C $\sin(2\theta)$

D Both A and C

#82

HARD

Simplify: $\sin(x) \cdot \csc(x) + \cos(x) \cdot \sec(x)$.

$$\sin(x) \cdot \csc(x) + \cos(x) \cdot \sec(x)$$

A 1

B 2

C 0

D $2\sin(x)$

#93

HARD

Prove: $\sec^2\theta - 1 = \tan^2\theta$. Which identity was used?

$$\sec^2\theta - 1 = \tan^2\theta$$

A $\sin^2\theta + \cos^2\theta = 1$ B $1 + \tan^2\theta = \sec^2\theta$ C $\sin(2\theta) = 2\sin\theta\cos\theta$ D $\cot^2\theta + 1 = \csc^2\theta$

INVERSE TRIG FUNCTIONS

#49

MEDIUM

Evaluate $\arcsin(1/2)$.

$\arcsin(1/2)$

A $30^\circ (\pi/6)$

B $60^\circ (\pi/3)$

C $45^\circ (\pi/4)$

D $90^\circ (\pi/2)$

#50

MEDIUM

$\arctan(1) = ?$

$\arctan(1)$

A $\pi/4$

B $\pi/3$

C $\pi/2$

D π

#51

MEDIUM

The domain of $\arcsin(x)$ is:

$\arcsin(x)$

A $[0, \pi]$

B $[-\pi/2, \pi/2]$

C $[-1, 1]$

D All real numbers

#110

HARD

Evaluate $\sin(\arccos(3/5))$.

$\sin(\arccos(3/5))$

A $3/5$

B $4/5$

C $3/4$

D $5/4$

LAW OF SINES & COSINES

#52

MEDIUM

In triangle ABC, $a/\sin A = b/\sin B$ is the:

$$a/\sin A = b/\sin B$$

A Law of Cosines

B Pythagorean Theorem

C Law of Sines

D Heron's Formula

#53

MEDIUM

Law of Cosines: $c^2 = a^2 + b^2 - 2ab \cdot \cos(C)$. When $C = 90^\circ$, this becomes:

$$c^2 = a^2 + b^2 - 2ab \cdot \cos(90^\circ)$$

A $c^2 = a^2 - b^2$

B $c^2 = a^2 + b^2$

C $c = a + b$

D $c^2 = 2ab$

#54

HARD

In triangle ABC, $a = 5$, $b = 7$, $C = 60^\circ$. Find c^2 .

$$a=5, \quad b=7, \quad C=60^\circ$$

A $c^2 = 39$

B $c^2 = 74$

C $c^2 = 49$

D $c^2 = 25$

#100

HARD

In triangle ABC: $A = 45^\circ$, $B = 60^\circ$, $a = 10$. Using Law of Sines, $b \approx$

$$A=45^\circ, \quad B=60^\circ, \quad a=10$$

A 12.2

B 8.2

C 14.1

D 10

#111

HARD

Two sides $a = 8$, $b = 5$ and included angle $C = 30^\circ$. Area of triangle =

$$a=8, b=5, C=30^\circ$$

A 10

B 20

C 40

D 5

CONIC SECTIONS

#55

EASY

Which equation represents a circle centered at the origin with radius 4?

A $x^2 + y^2 = 4$

B $x^2 + y^2 = 16$

C $x^2/4 + y^2/4 = 1$

D $x + y = 4$

#56

EASY

The parabola $y = x^2$ opens:

$$y = x^2$$

A Downward

B Leftward

C Upward

D Rightward

#57

MEDIUM

The center of the circle $(x - 3)^2 + (y + 2)^2 = 25$ is:

$$(x - 3)^2 + (y + 2)^2 = 25$$

A $(-3, 2)$

B $(3, -2)$

C $(3, 2)$

D $(-3, -2)$

#58

MEDIUM

For the ellipse $x^2/16 + y^2/9 = 1$, the length of the major axis is:

$$x^2/16 + y^2/9 = 1$$

A 3

B 4

C 6

D 8

#59

MEDIUM

A hyperbola $x^2/9 - y^2/4 = 1$ has transverse axis along the:

$$x^2/9 - y^2/4 = 1$$

A y-axis

B x-axis

C Both axes

D No axis

#60

HARD

Convert to standard form: $x^2 + y^2 - 4x + 6y - 3 = 0$. What is the radius?

$$x^2 + y^2 - 4x + 6y - 3 = 0$$

A $r = 4$

B $r = 5$

C $r = \sqrt{16}$

D $r = 4\sqrt{2}$

#84

HARD

Find the vertex of the parabola $y = 2x^2 - 8x + 5$.

$$y = 2x^2 - 8x + 5$$

A $(2, -3)$

B $(-2, 25)$

C $(4, 5)$

D $(2, 3)$

#85

HARD

Foci of the ellipse $x^2/25 + y^2/16 = 1$ are at $x = \pm c$, where $c =$

$$x^2/25 + y^2/16 = 1$$

A $c = 3$

B $c = 4$

C $c = 5$

D $c = \sqrt{41}$

#98

HARD

What are the asymptotes of the hyperbola $x^2/9 - y^2/4 = 1$?

$$x^2/9 - y^2/4 = 1$$

A $y = \pm(2/3)x$

B $y = \pm(3/2)x$

C $y = \pm 2x$

D $y = \pm 3x$

#108

HARD

A parabola $x^2 = 8y$ has its focus at:

$$x^2 = 8y$$

A (0, 2)

B (0, 8)

C (2, 0)

D (0, -2)

#118

HARD

Find the equation of the parabola with vertex (0,0) and directrix $y = -3$.

vertex (0,0), directrix $y = -3$

A $x^2 = 12y$

B $x^2 = -12y$

C $y^2 = 12x$

D $x^2 = 6y$

#61

EASY

In an arithmetic sequence, $a_1 = 3$ and $d = 4$. Find a_5 .

$$a_1 = 3, d = 4$$

A 19

B 23

C 15

D 16

#62

EASY

The common ratio r of the geometric sequence 2, 6, 18, 54, ... is:

$$2, 6, 18, 54, \dots$$

A 2

B 3

C 4

D 6

#63

MEDIUM

Sum of first n terms of arithmetic sequence: S_5 for 1, 3, 5, 7, 9.

1, 3, 5, 7, 9

A 20

B 25

C 30

D 15

#64

MEDIUM

A geometric series with $a_1 = 2$, $r = 1/2$ has an infinite sum of:

$a_1 = 2, r = 1/2$

A 2

B 4

C 1

D 8

#65

MEDIUM

$\sum_{k=1}^5 k = ?$ (sum of first 5 natural numbers)

$$\sum k, k=1 \text{ to } 5$$

A 10

B 15

C 20

D 25

#66

HARD

Find the 10th term of the geometric sequence: $a_1 = 3, r = 2$.

$$a_1 = 3, r = 2$$

A 1536

B 3072

C 1024

D 768

#86

HARD

How many terms are in $\sum_{k=3}^{10} k^2$?

$$\sum k^2, k=3 \text{ to } 10$$

A 7

B 8

C 10

D 30

#97

HARD

Express 0.333... as a fraction using infinite geometric series.

$$0.333\dots = 0.3 + 0.03 + 0.003 + \dots$$

A $\frac{1}{3}$ B $\frac{3}{9}$ C $\frac{3}{10}$ D $\frac{1}{4}$

#107

HARD

Use Binomial Theorem: find the coefficient of x^2 in $(x + 2)^4$.

$(x + 2)^4$, coefficient of x^2

A 16

B 24

C 6

D 4

#117

HARD

A sequence is defined by $a_n = n^2 - n$. What is a_4 ?

$a_n = n^2 - n, n=4$

A 8

B 12

C 16

D 20

#67

EASY

Solve the system: $x + y = 5$, $x - y = 1$.

$$x + y = 5 \quad x - y = 1$$

A $x=3, y=2$

B $x=2, y=3$

C $x=4, y=1$

D $x=1, y=4$

#68

EASY

The determinant of the 2×2 matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is:

$$| \begin{bmatrix} a & b \\ c & d \end{bmatrix} |$$

A $ab - cd$

B $ad + bc$

C $ad - bc$

D $ac - bd$

#69

MEDIUM

Find $\det([2,3],[1,4])$.

$$| \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix} |$$

A 5

B 11

C 8

D -5

#70

MEDIUM

What is the product of $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ with any matrix A ?

$$I \cdot A$$

A 0

B $2A$ C A D A^2

#87

HARD

Solve by Cramer's Rule: $2x + y = 7$, $x - y = 2$. Find x .

$$2x + y = 7 \quad x - y = 2$$

A $x = 3$

B $x = 4$

C $x = 2$

D $x = 1$

#101

HARD

The system $2x + y = 4$, $4x + 2y = 8$ has:

$$2x + y = 4 \quad 4x + 2y = 8$$

A One solution

B No solution

C Infinitely many solutions

D Two solutions

#109

HARD

For a 2×2 matrix A , if $\det(A) = 0$, then A is:

$$\det(A) = 0$$

- A Invertible
- B Non-square
- C Singular (no inverse)
- D The identity

#120

HARD

Given $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, find A^{-1} . What is the top-left entry?

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

- A -2
- B 4
- C 2
- D -4

#71

MEDIUM

Evaluate: $\lim_{x \rightarrow 2} (x^2 - 4)/(x - 2)$.

$$\lim_{x \rightarrow 2} (x^2 - 4)/(x - 2)$$

A 0

B 2

C 4

D Does not exist

#72

MEDIUM

$\lim_{x \rightarrow \infty} 1/x = ?$

$$\lim_{x \rightarrow \infty} 1/x$$

A ∞

B 1

C 0

D -1

#73

MEDIUM

$$\lim_{x \rightarrow 3} (2x + 1) = ?$$

$$\lim_{x \rightarrow 3} (2x + 1)$$

A 5

B 6

C 7

D 8

#74

HARD

$$\lim_{x \rightarrow 0} \sin(x)/x = ?$$

$$\lim_{x \rightarrow 0} \sin(x)/x$$

A 0

B ∞

C 1

D Does not exist

#88

HARD

$$\lim_{x \rightarrow \infty} (3x^2 + 5)/(x^2 - 2) = ?$$

$$\lim_{x \rightarrow \infty} (3x^2 + 5)/(x^2 - 2)$$

A 5

B 0

C 3

D ∞

#89

HARD

$$\lim_{x \rightarrow 4^+} 1/(x-4) = ?$$

$$\lim_{x \rightarrow 4^+} 1/(x-4)$$

A 0

B $-\infty$ C $+\infty$

D 1

#102

HARD

Does $\lim_{x \rightarrow 0} \sin(1/x)$ exist?

$$\lim_{x \rightarrow 0} \sin(1/x)$$

A Yes, = 0

B Yes, = 1

C No, it does not exist

D Yes, = ∞

#121

HARD

Evaluate $\lim_{x \rightarrow 0} (e^x - 1)/x$.

$$\lim_{x \rightarrow 0} (e^x - 1)/x$$

A 0

B e

C 1

D ∞

Answer Key

#1 C	#2 A	#3 B	#4 A	#5 B
#6 B	#7 B	#8 C	#9 C	#10 B
#11 B	#12 B	#13 A	#14 B	#15 C
#16 C	#17 B	#18 A	#19 A	#20 A
#21 B	#22 C	#23 C	#24 A	#25 A
#26 B	#27 A	#28 A	#29 B	#30 B
#31 B	#32 C	#33 B	#34 B	#35 B
#36 C	#37 B	#38 A	#39 A	#40 A
#41 B	#42 B	#43 C	#44 B	#45 B
#46 B	#47 A	#48 D	#49 A	#50 A
#51 C	#52 C	#53 B	#54 A	#55 B
#56 C	#57 B	#58 D	#59 B	#60 A
#61 A	#62 B	#63 B	#64 B	#65 B
#66 A	#67 A	#68 C	#69 A	#70 C
#71 C	#72 C	#73 C	#74 C	#75 B
#76 A	#77 A	#78 A	#79 A	#80 B
#81 B	#82 B	#83 A	#84 A	#85 A
#86 B	#87 A	#88 C	#89 C	#90 A
#91 A	#92 B	#93 B	#94 B	#95 C
#96 A	#97 A	#98 A	#99 B	#100 A

#101C	#102C	#103A	#104A	#105B
#106A	#107B	#108A	#109C	#110B
#111A	#112A	#113B	#114C	#115A
#116A	#117B	#118A	#119A	#120A
#121C				