1. Suppose

$$A = \begin{bmatrix} 0 & 2 & 3 \\ -89 & -5 & 5 \\ 1 & 6 & -1 \end{bmatrix}$$

compute $\det(A)$

A $-30$ B $-1755$ C $2$ D $6$ E none of these

2. There are 1110 light bulbs lined up in a row in a long room. Each bulb has its own switch and is currently switched off. The room has an entry door and an exit door. There are 1110 people lined up outside the entry door. Each bulb is numbered consecutively from 1 to 1110. So is each person.

Person No. 1 enters the room, switches on every bulb, and exits. Person No. 2 enters and flips the switch on every second bulb (turning off bulbs 2, 4, 6...). Person No. 3 enters and flips the switch on every third bulb (changing the state on bulbs 3, 6, 9...). This continues until all 1110 people have passed through the room. How many of the light bulbs are illuminated after the 1110th person has passed through the room?

A 39

B 33

C 35

D 43

E 34

F none of these

3. What is the units digits of

$$28^{3944}$$

A 8

B 7

C 6

D none of these

4. Suppose $a - 5 = b + 2 = c - 2 = d - 6 = a + b + c + d - 5$

Find the value of $a + b + c + d$

A 3

B $\frac{20}{3}$

C $-13$

D $-\frac{22}{3}$

E $\frac{37}{3}$

F none of these

5. Suppose

$$A = \begin{bmatrix} -3 & -4 & -22 \\ -4 & -1 & 5 \\ 0 & 2 & 0 \end{bmatrix}$$

If it exists, find the inverse, $A^{-1}$

A $\begin{bmatrix} \frac{5}{4} & \frac{1}{2} & \frac{1}{4} \\ -1 & -1 & -1 \\ \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \end{bmatrix}$

B $\begin{bmatrix} -\frac{5}{103} & -\frac{22}{103} & -\frac{21}{103} \\ 0 & 0 & \frac{1}{2} \\ -\frac{4}{103} & \frac{3}{103} & -\frac{13}{206} \end{bmatrix}$

C $\begin{bmatrix} -\frac{1}{4} & 0 & \frac{1}{4} \\ -\frac{19}{40} & -\frac{1}{10} & \frac{51}{40} \\ -\frac{1}{40} & \frac{1}{10} & \frac{9}{40} \end{bmatrix}$

D $\begin{bmatrix} -\frac{13}{8} & \frac{21}{8} & \frac{15}{8} \\ -\frac{3}{8} & \frac{3}{8} & \frac{1}{8} \\ \frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} \end{bmatrix}$

E $\begin{bmatrix} -\frac{19}{13} & \frac{14}{13} & \frac{16}{13} \\ -\frac{5}{13} & \frac{3}{13} & \frac{9}{13} \\ -\frac{9}{13} & \frac{8}{13} & \frac{11}{13} \end{bmatrix}$

F none of these

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6. Given

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 2 & 1 & -1 & -5 \\ -1 & 1 & 0 & 5 \end{bmatrix}$$

Determine the associated linear system of equations , also determine the echelon row reduce matrix, and finally, determine the associated system of equations after row reduction.

A
$$-x - y = -2$$
$$-2z = 1$$
$$x - y - 100z = 23$$

B
$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 6 \\ 0 & 0 & 1 & 13 \end{bmatrix}$$

C
$$x = 1$$
$$2x + y - z = -5$$
$$-x + y = 5$$

D
$$x - 4y + 3z = -2$$
$$-y - 2z = -2$$
$$x + z = -14$$

E
$$x = 1$$
$$y = 6$$
$$z = 13$$

F
$$-x - 3y = -1$$
$$-x + y = -1$$
$$2y - z = -2$$

G
$$\begin{bmatrix} 1 & 1 & 1 & 3 \\ 0 & 2 & 1 & 2 \\ 0 & 0 & 2 & 4 \end{bmatrix}$$

H none of these

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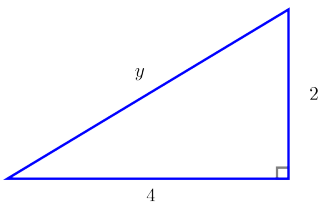
7.




A $y^2 = 2^2 - 4^2$ B $y = \pm\sqrt{2^2 - 4^2}$ C $y = \pm\sqrt{2^2 + 4^2}$ D $y^2 = 2^2 + 4^2$

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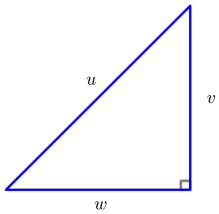
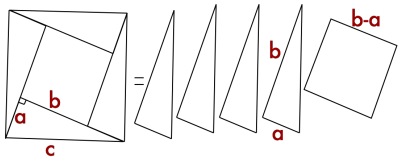
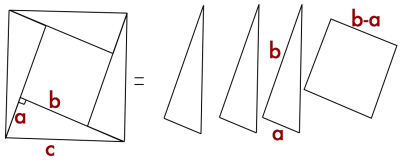
8. Pythagorean Theorem Says



A $v^2+u^2=w^2$ B $u^2=v^2-w^2$ C $v^2+w^2=u^2$ D none of these

9. ideas that help prove the pythagorean theorem



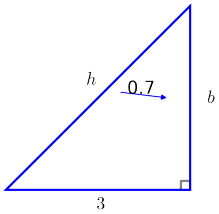




A

B

C none of these

10. consider the sides and ratio given below:

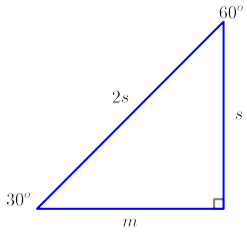



A $b \approx 3.061$ B $b \approx 3.294$ C $b \approx 2.941$
D $h \approx 3.529$ E $h \approx 4.201$ F $h \approx 4.286$
G not enough information H none of these

11. Among the tallest buildings in the world is the Burj Khalifa in Dubai, rising 2,722 ft from the ground. Assume the earth is perfectly round with radius 4014 mi, approximate how far onto the horizon one can see directly from the very top of the building. [hint: pythagoras]

A 58.545 mi B 66.265 mi C 77.845 mi
D 64.335 mi E none of these

12. Assume $h$, $m$, and $s$ are positive and $h$ is the hypothenuse. What can be said about the following:




A $(2s)^2 = s^2 + m^2$ B $h\sqrt{3} = m$ C $4s^2 = s^2 + m^2$ D $2s^2 = s^2 + m^2$ E $3s^2 = m^2$ F $4s^2 = m^2 + m^2$