1. ..... suffer from a pixelization effect on zoom in.
   a. Raster Images
   b. Vector Images
   c. Both of them
   d. None of them
2. Raster images are made up of pixels and do not depend on the resolution. What is wrong about this sentence?
   a. The first part is wrong. Instead, raster images are made up of object description.
   a. The second part is wrong. Instead, raster images depend on the resolution.
   a. None of the above. The sentence is already correct.
3. Vector images are resolution dependent.
   a. True
   b. False
4. For the line represented by $f(x,y) = Ax + By + C = 0$, the normal vector on the line is:
   a. [A, C]
   b. [B, C]
   c. [B, A]
   d. [A, B]
5. For the line represented by $f(x,y) = Ax + By + C = 0$ and passing by (x_0, y_0) and (x_1, y_1), the values of A and B are
   a. $A = y_0 - y_1$ and $B = x_1 - x_0$
   b. $A = y_1 - y_0$ and $B = x_1 - x_0$
   c. $A = y_0 - y_1$ and $B = x_0 - x_1$
   d. $A = y_1 - y_0$ and $B = x_0 - x_1$
6. If we add an RGB color [255, 0, 0] to another color [0, 255, 0], the result is the color [255, 255, 0].
   a. True
   b. False
7. The following line-drawing algorithm suffer from the following problems:

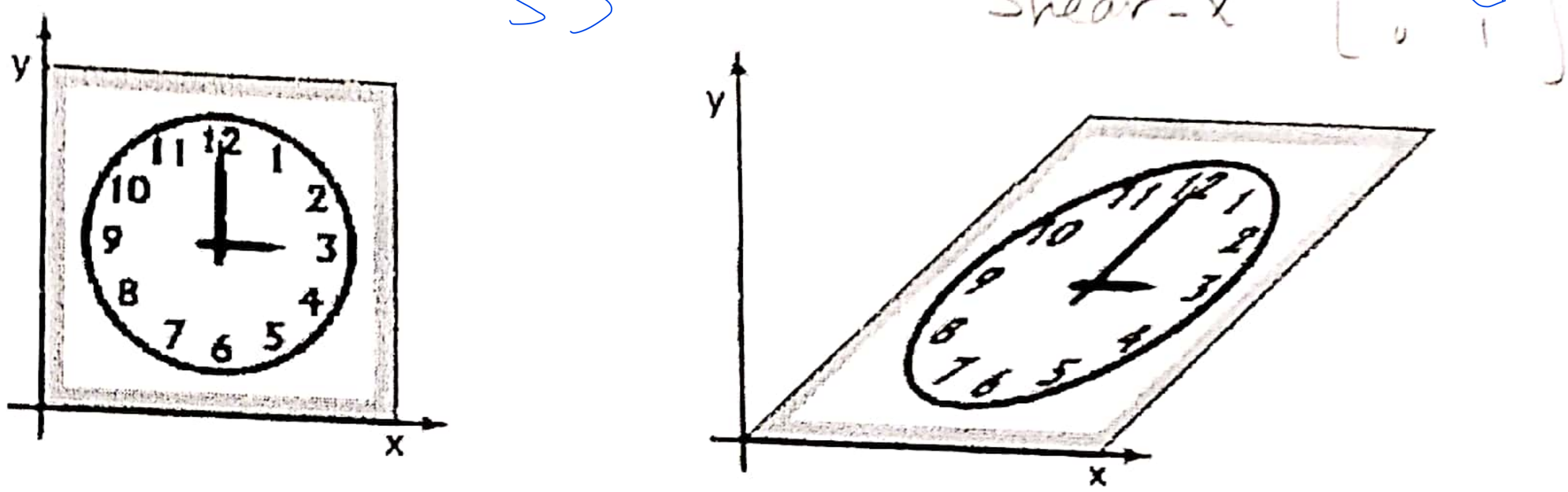
```
y = y0
d = f(x0 + 1, y0 + 0.5)
for x = x0 to x1 do
    draw(x, y)
    if d < 0 then
        y = y + 1
        d = d + (x1 − x0) + (y0 − y1)
    else
        d = d + (y0 − y1)
```

a. Excessive evaluation for the function of the line
b. Floating-point calculations
c. Both of them
d. None of them

8. Which of the following transformations has an orthonormal matrix?
a. Scaling
b. Rotation
c. Shearing
d. Translation

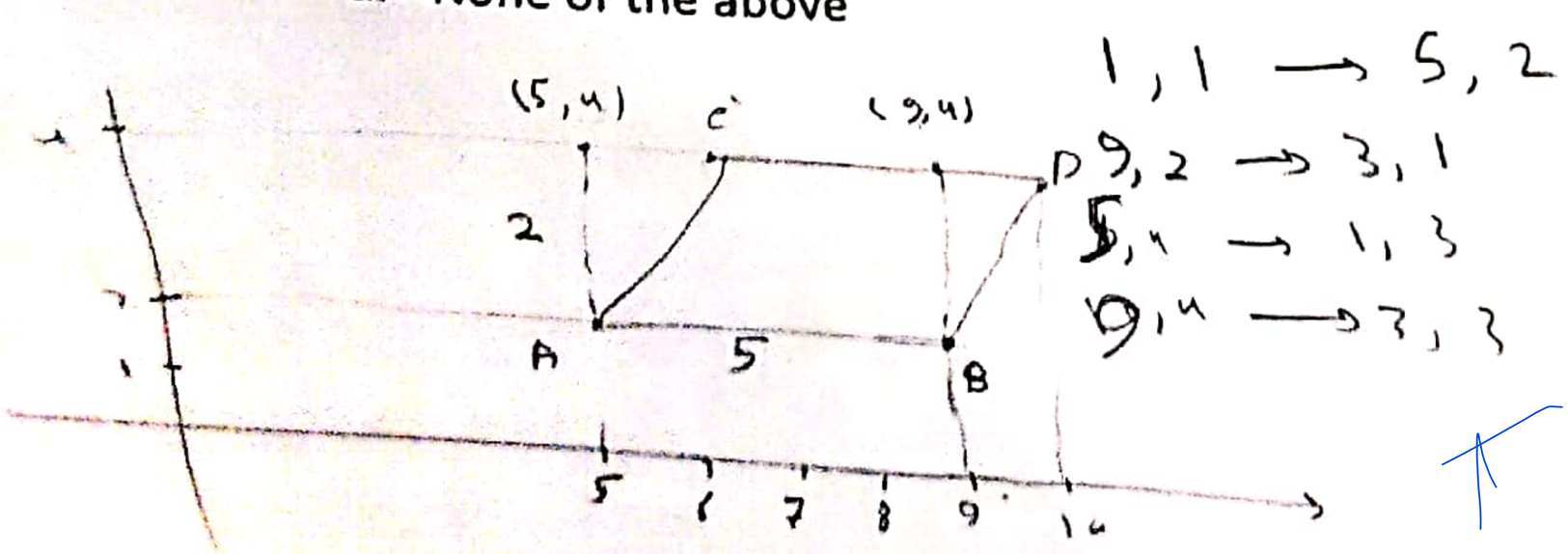
9. The 2D Reflection around the line y=x is orthonormal.
a. True
b. False

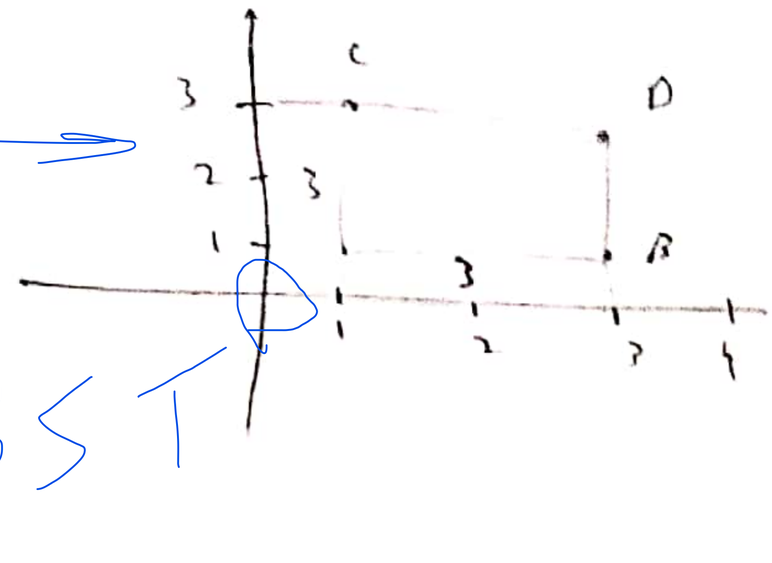
10. To transform the shape on the left to the shape on the right, the following transformation matrix is needed.



a. [1, 0; 0, 1]
b. [1, 2; 0, 1]
c. [1, 1; 0, 1]
d. [1, 0; 1, 1]

11. If a rectangle defined by the points A (1,1), B (3,1), C (1,3) and D (3,3) is transformed to the new points A' (5,2), B' (9,2), C'(6,4), D'(10, 4). What is the order of transformations needed to transform ABCD to A'B'C'D'?
a. Translation, Uniform Scaling, Shearing in x-direction, Translation.
b. Translation, Non-uniform Scaling, Shearing in x-direction, Translation.
c. Translation, Non-uniform Scaling, Shearing in y-direction, Translation.
d. None of the above





12. If rotation R (0) is applied to point P = (x,y), followed by reflection about the x-axis, followed by reflection about the y-axis and finally a uniform scaling is applied by factor σ to obtain the point P', then which of the following is correct about the transformation of point P to point P'?

    a. P' = R (0) * R (180) * S(σ) * P
    b. P' = S(σ) * R (-180) * R (0) * P
    c. P' = S(σ) * R (90) * R(90) * R (0) * P
    d. None of the above

13. The off-diagonal elements in a transformation matrix may be non-zeros only if the transformation applied is:

    a. Scaling
    b. Shearing
    c. Reflection
    d. Scaling followed by reflection.

The next four questions are related:

14. What are the transformations needed for a reflection about an arbitrary line y = mx + c? (c>0) (regardless of the order of transformations).

    a. Translation
    b. Scaling
    c. Reflection
    d. Rotation

15. If translation is needed, how many translation operations are needed?

    a. 1
    b. 2
    c. 3
    d. Translation is not needed.

16. If scaling is needed, what are the scaling factors Sx and Sy?

    a. Sx = m, Sy = 1
    b. Sx = 1, Sy = m
    c. Sx = m/c, Sy = 1/c
    d. Scaling is not needed.

17. If rotation is needed, what will be the absolute value of the angle of rotation?

    a. |m|
    b. $|\tan^{-1} m|$
    c. $|\tan^{-1} (m/c)|$
    d. Rotation is not needed.

18. The rotation matrix [cos θ, sin θ; -sin θ, cos θ]
    a. Rotates points around the X axis using an angle θ counter clockwise.
    b. Rotates points around the Y axis using an angle θ clockwise.
    c. Rotates points around the origin using an angle θ counter clockwise.
    d. Rotates points around the origin using an angle θ clockwise.
19. The transformation matrix [-1, 0; 0, 1]
    a. Reflects points around the X axis
    b. Reflects points around the Y axis
    c. None of them
20. If we transform a point by a transformation matrix M_1 followed by another transformation matrix M_2, this is equivalent to the transformation matrix $M = M_1 M_2$.
    a. True
    b. False
21. The inverse of [cos θ, -sin θ; sin θ, cos θ] is
    a. [cos θ, sin θ; -sin θ, cos θ]
    b. [cos θ, -sin θ; sin θ, cos θ]
    c. [cos -θ, -sin -θ; sin -θ, cos -θ]
    d. None of the above
22. Given that R = [cos θ, -sin θ; sin θ, cos θ] and S = [cos α, -sin α; sin α, cos α],
    a. R S ≠ S R because the order of transformations matter.
    b. R S = S R
    c. It depends on θ and α.
23. The 2D point [1 5] is represented in homogeneous coordinates as
    a. [1 5 1]
    b. [1 5 0]
    c. [1 5 5]
    d. None of the above
24. The 2D vector [1 5] is represented in homogeneous coordinates as
    a. [1 5 1]
    b. [1 5 0]
    c. [1 5 5]
    d. None of the above

rotations doesn't matter in order

25. The following matrix represents

$$\begin{bmatrix} R_{2\times 2} & t_{2\times 1} \\ 0^T & 1 \end{bmatrix}$$

a. A translation then a rotation in the 2D space
b. A translation then a rotation in the 3D space
c. A rotation then a translation in the 3D space
d. None of the above

26. Given that xyz is the canonical frame, the following matrix

$$\begin{bmatrix} x_u & x_v & x_w \\ y_u & y_v & y_w \\ z_u & z_v & z_w \end{bmatrix}$$

a. Rotates uvw to xyz
b. Rotates xyz to uvw
c. Changes the coordinate system from uvw to xyz
d. Changes the coordinate system from xyz to uvw

27. Given the canonical frame xy and another arbitrary frame uv that is located at e, the following matrix represents

$$\begin{bmatrix} u_p \\ v_p \end{bmatrix} = \begin{bmatrix} x_u & y_u & 0 \\ x_v & y_v & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & -x_e \\ 0 & 1 & -y_e \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_p \\ y_p \end{bmatrix}$$

a. The canonical to frame transformation
b. The frame to canonical transformation
c. Either of the above
d. None of the above

28. If we rotate the points of a surface using the rotation matrix M, the surface normal vectors can be transformed by the matrix

a. M^{-1}
b. M^T
c. M
d. None of the above

trn(inv(M))=M

as R is orthonormal

29. A windowing transform may be obtained by
    a. Translation then scaling then translation
    b. Translation then scaling
    c. Scaling then translation
    d. None of the above
30. Which of the following projections have the property that parallel lines remain parallel and never intersect?
    a. Orthographic projection
    b. Perspective Projection
    c. None of them
31. In the perspective projection, there is a single vanishing point in any image because all parallel lines intersect at this point.
    a. True
    b. False
32. The modeling transformation converts points from the object space into the world space.
    a. True
    b. False
33. The viewport transformation is a
    a. Rotation transformation
    b. Windowing transform
    c. Canonical to frame transformation
    d. Frame to canonical transformation
34. The camera transformation is a
    a. Rotation transformation
    b. Windowing transform
    c. Canonical to frame transformation
    d. Frame to canonical transformation
35. The orthographic projection transformation is a
    a. Rotation transformation
    b. Windowing transform
    c. Canonical to frame transformation
    d. Frame to canonical transformation
36. The modeling transformation is a
    a. Rotation transformation
    b. Windowing transform
    c. Canonical to frame transformation
    d. Frame to canonical transformation

4 transformations
1- modeling
2- camera
3- projection
4- viewport

37. Which transformation depends on the object position and orientation?

a. Camera transformation
b. Viewport transformation
c. Modeling transformation
d. Projection transformation

38. Which transformation depends on the resolution of the output image?

a. Camera transformation
b. Viewport transformation
c. Modeling transformation
d. Projection transformation

39. If the camera was located at the origin of the world coordinates, then camera transformation matrix must be the identity matrix.

a. True
b. False

40. If the distance between point A and point B is 2. Assume that there is a camera at location (0,10,0), looking at the origin and its up vector points in the direction (1,0,1). What will be the distance between A and B after applying the camera transform to them?

a. 4
b. $\sqrt{2}$
c. 2
d. Cannot be determined using the given information.