

C

0 0 0

0

y^5

0

0

0

, $\dots \ll 1$,

θ

fi

$$\int_0^{2\pi} \int_0^\pi \mu \sin \theta \, d\theta \, d\phi = 4\pi \mu$$

C. The volume element $dV = r^2 \sin \theta \, dr \, d\theta \, d\phi$ is used to calculate the volume of a sphere of radius R . The volume is given by:

$$V = \int_0^R \int_0^\pi \int_0^{2\pi} r^2 \sin \theta \, d\phi \, d\theta \, dr = \frac{4}{3}\pi R^3$$

The surface area of a sphere is given by:

$$A = \int_0^\pi \int_0^{2\pi} R^2 \sin \theta \, d\phi \, d\theta = 4\pi R^2$$

The center of mass of a uniform sphere is at the center, $(0, 0, 0)$.

Each of the following problems is a variation of the above.

(2) Find the volume of a sphere of radius R that lies in the first octant.

(3) Find the volume of a sphere of radius R that lies in the first octant and is above the plane $z = R/2$.

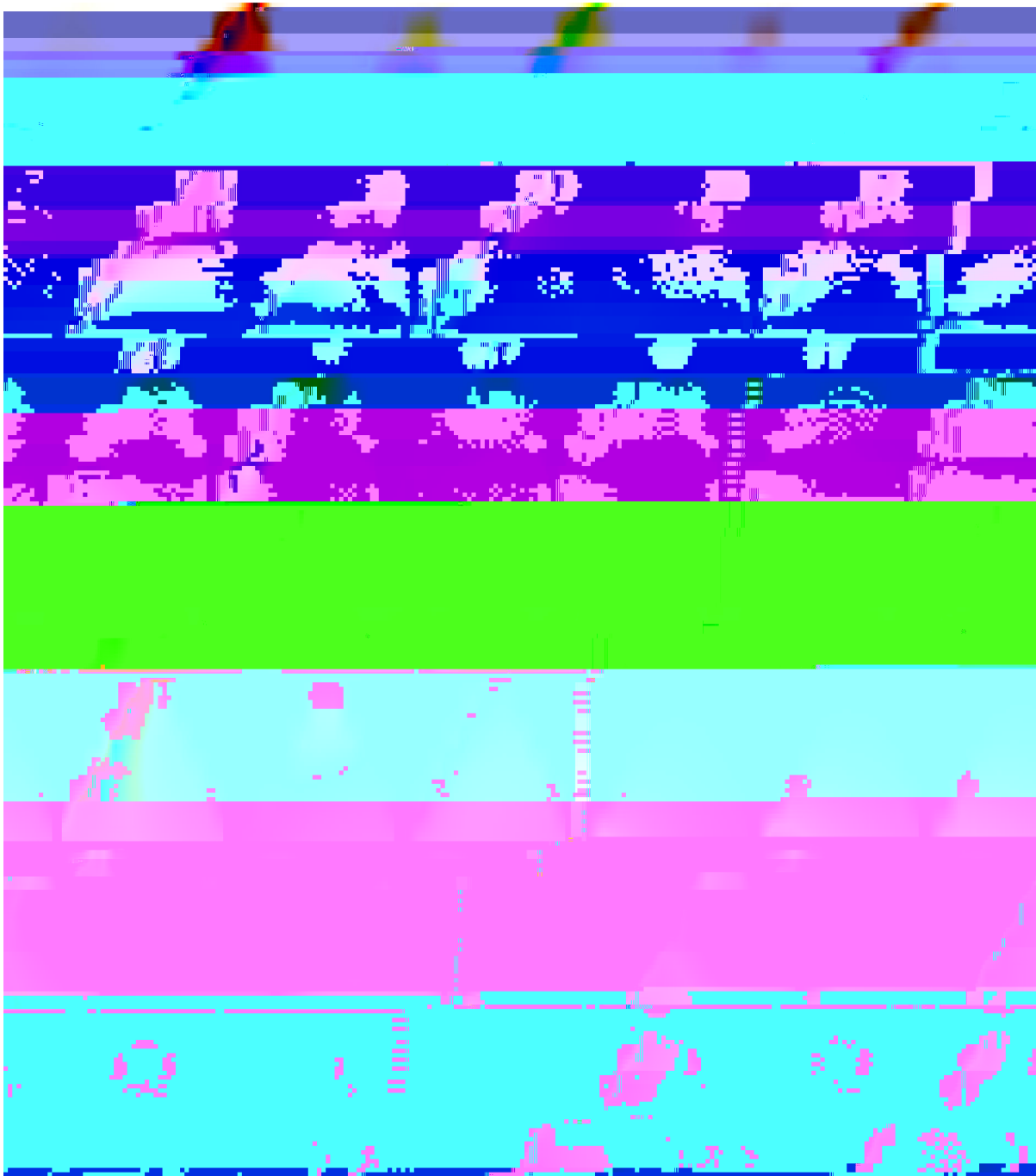
5 y5 55 ,

5 5 5

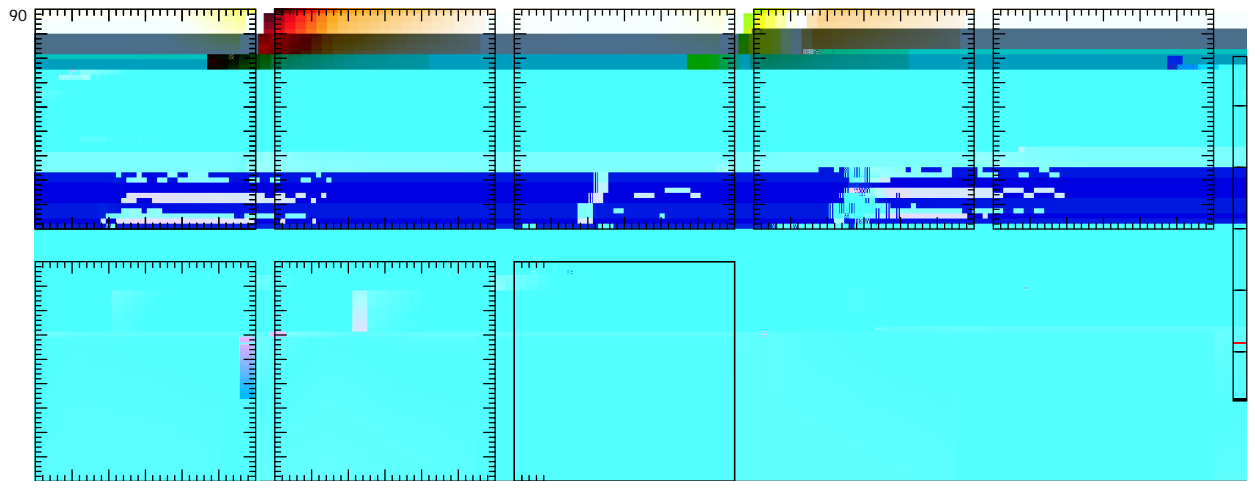
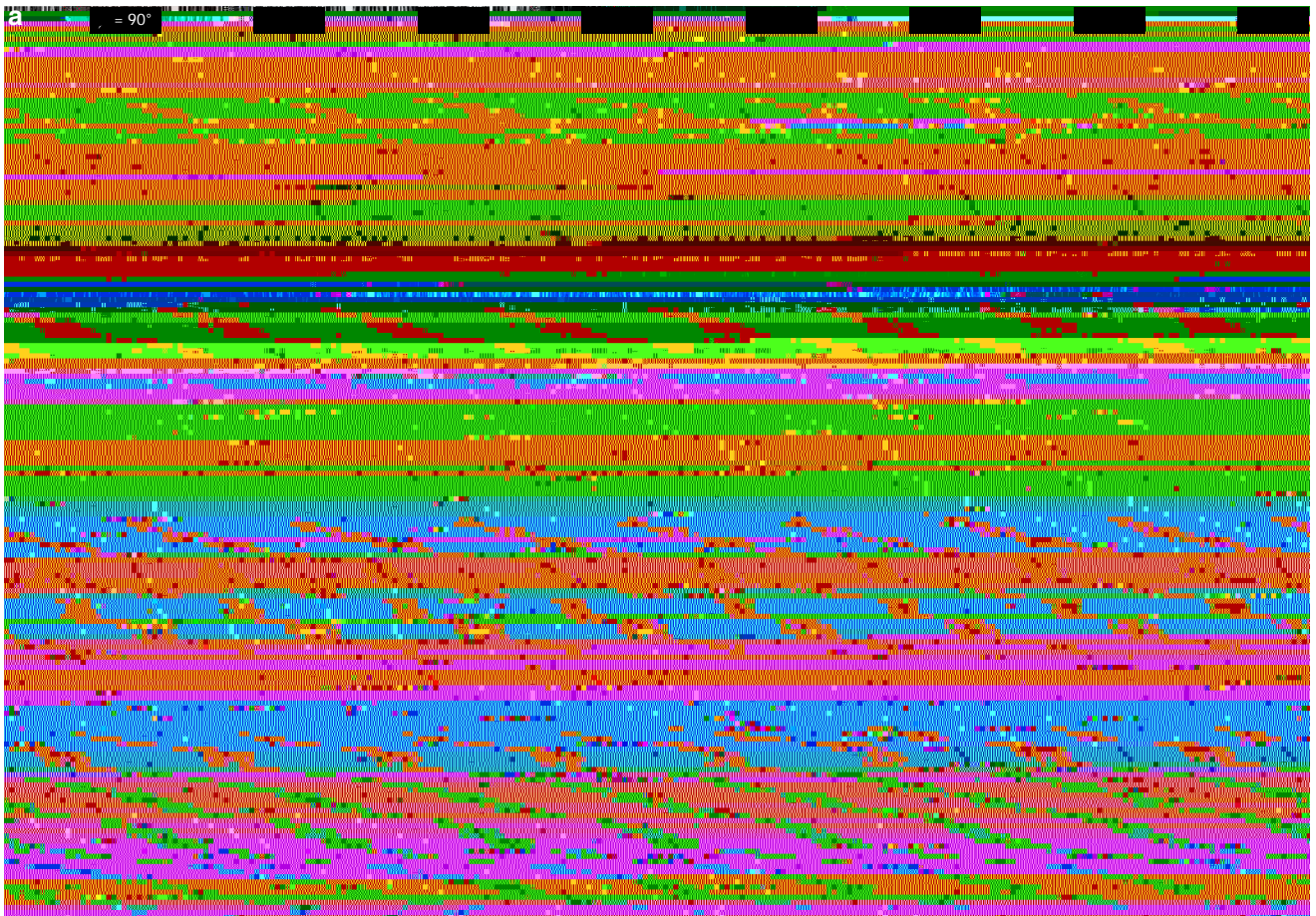
$$\begin{aligned}
 & y^5 \cdot y^5 = y^{10} \\
 & \frac{y^5}{y^5} = y^0 = 1
 \end{aligned}$$

0.5 0 0 0 0 0

0 0



60



16- $f(x) = x^2 - 9$, $f'(x) = 2x$, $f''(x) = 2$.
 $f(x) = 0 \Rightarrow x^2 - 9 = 0 \Rightarrow x = \pm 3$.
 $f'(3) = 6 > 0$, $f'(-3) = -6 < 0$.
 $f''(3) = 2 > 0$, $f''(-3) = 2 > 0$.
 $(-3, 3)$ is the interval of concavity.

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