2023 MATH FIELD DAY **NAME:** _____
ANALYTIC GEOMETRY (12^{th} GRADE) **SCHOOL:** _____

All answers must be exact and not decimal approximations. Radicals must be expressed in simplest radical form, and fractions should be expressed in lowest terms.

1._____ Find the slope-intercept form of the equation of the line passing through the point $A(2,4)$ and bisecting the line segment joining the points $B(1,1)$ and $C(3,-2)$.

2._____ Find the area of the triangle bounded by the lines $y+x=3$, $2y=x+3$ and $y=1$.

3._____ Determine the coordinates of the foci of the hyperbola $(x+1)^2-(y-1)^2=2$.

4._____ Identify the type of conic section whose equation is given by $x^2+2y^2+4y=6x-9$.

5._____ Find an equation for the ellipse with foci $(0,0)$, $(2,0)$ and major axis of length 4.

6._____ Find the equation of the parabola with focus $(\frac{3}{2},1)$ and directrix $x=\frac{1}{2}$.

7._____ Determine the points of intersection of the ellipse $x^2+\dfrac{y^2}{4}=1$ and the parabola $y^2=4x$.

8._____ Determine a rational function in lowest terms with asymptotes $x=1, x=2, x=3, y=4$ and x-intercept $(-1,0)$

9._____ Determine the area bounded by the curve $2y^2+x^2=2+4y$.

10._____ Determine the equation of the resulting ellipse when the curve $\frac{y^2}{3}+\frac{(x-1)^2}{2}=1$ is rotated about the origin clockwise by 90°, then shifted to the right 1 unit.