Pre-Calc. Review Worksheet 5

① $\begin{bmatrix} 3 & -8 \\ 12 & -4 \end{bmatrix}$ $\det = 3(-4) - 12(-8)$
$= 84$

2. $\begin{bmatrix} 1 & 4 & -2 \\ 3 & -1 & 1 \\ 5 & 2 & 7 \end{bmatrix} \begin{matrix} 1 & 4 \\ 3 & -1 \\ 5 & 2 \end{matrix}$ $\det = -95$

$10 + 2 + 84 = 96$

$-7 + 20 - 12 = 1$

$3 + 0 + 12 = 15$

3. $\begin{bmatrix} 0 & 3 & 1 \\ 4 & -1 & 1 \\ -3 & 2 & 1 \end{bmatrix} \begin{matrix} 0 & 3 \\ 4 & -1 \\ -3 & 2 \end{matrix}$

$0 - 9 + 8 = -1$

$\det = -16$

Area $= -\frac{1}{2}(-16) = 8$

④ Cramer's Rule:

$A = \begin{bmatrix} 2 & 3 & -4 \\ 1 & -1 & -5 \\ -2 & 4 & 5 \end{bmatrix}$ $\det(A) = 37$

$A_x = \begin{bmatrix} 4 & 3 & -4 \\ 0 & -1 & -5 \\ 9 & 4 & 5 \end{bmatrix}$ $\det(A_x) = -111$

$A_y = \begin{bmatrix} 2 & 4 & -4 \\ 1 & 0 & -5 \\ -2 & 9 & 5 \end{bmatrix}$ $\det(A_y) = 74$

$A_z = \begin{bmatrix} 2 & 3 & 4 \\ 1 & -1 & 0 \\ -2 & 4 & 9 \end{bmatrix}$ $\det(A_z) = -37$

$x = \frac{-111}{37} = -3$

$y = \frac{74}{37} = 2$

$z = \frac{-37}{37} = -1$

④ Using an Inverse Matrix:

$A = \begin{bmatrix} 2 & 3 & -4 \\ 1 & -1 & -5 \\ -2 & 4 & 5 \end{bmatrix}$ $B = \begin{bmatrix} 4 \\ 0 \\ 9 \end{bmatrix}$

$A^{-1} = \begin{bmatrix} 15/37 & -31/37 & -19/37 \\ 5/37 & 2/37 & 6/37 \\ 2/37 & -14/37 & -5/37 \end{bmatrix}$

$AX = B$

$X = A^{-1}B$

$= \begin{bmatrix} -3 \\ 2 \\ -1 \end{bmatrix}$

⑤ $x^2 + 6x + y^2 - 2y = -1$

$x^2 + 6x + (3)^2 + y^2 - 2y + (-1)^2 = 1 + 3^2 + (-1)^2$

$(x+3)^2 + (y-1)^2 = 11$

center $= (-3, 1)$

$r = \sqrt{11}$

⑥ $y^2 - 6y = 12x + 15$

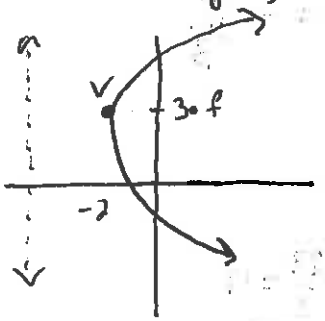
$y^2 - 6y + (-3)^2 = 12x + 15 + (-3)^2$

$(y-3)^2 = 12x + 24$

$(y-3) = 12(x+2)$

$4p = 12$

$p = 3$



$V = (-2, 3)$

$f = (1, 3)$

directrix: $x = -5$

(7) $\frac{(x+1)^2}{64} + \frac{(y-4)^2}{36} = 1$

Center: $(-1, 4)$

$a = \sqrt{64} = 8$

Vertex: $(7, 4), (-9, 4)$

$c = \sqrt{64-36}$
$= \sqrt{28}$
$= 2\sqrt{7}$

foci: $(-1 \pm 2\sqrt{7}, 4)$

$e = \frac{2\sqrt{7}}{8} = \frac{\sqrt{7}}{4}$

(8) $\frac{(y+2)^2}{4} - \frac{x^2}{12} = 1$

Center: $(0, -2)$

$a = \sqrt{4} = 2$

Vertex: $(0, 0), (0, -4)$

$c = \sqrt{4+12}$
$= \sqrt{16}$
$= 4$

foci: $(0, 2), (0, -6)$

asymptotes: $(y+2) = \pm \frac{2}{\sqrt{12}}(x-0)$

(9) $I(-4, 5)$ $F(9, 1)$

$v = \langle 9 - -4, 1 - 5 \rangle$
$= \langle 13, -4 \rangle$

$= 13i - 4j$

(10) $(4, -4\sqrt{3})$

$r = \sqrt{4^2 + (-4\sqrt{3})^2}$ $\theta = \tan^{-1}\left(\frac{-4\sqrt{3}}{4}\right)$

$= \sqrt{64}$ $= -60°$
$= 8$ $= -\frac{\pi}{3}$

$\left(8, -\frac{\pi}{3}\right)$

(11) $\{8, 4, 10\}$

$s = \frac{8+4+10}{2} = \frac{22}{2} = 11$

$K = \sqrt{11(11-8)(11-4)(11-10)}$
$= \sqrt{231}$
≈ 15.2 sq. units.

(12) $(-2 + 2\sqrt{3}i)^3$ QII

$r = \sqrt{(-2)^2 + (2\sqrt{3})^2}$
$= \sqrt{16}$
$= 4$

$\theta = \tan^{-1}\left(\frac{2\sqrt{3}}{-2}\right)$
$= -60$ QIV
$= 120°$ QII

$z^3 = 4^3(\cos(3 \cdot 120) + i\sin(3 \cdot 120))$
$= 64(1 + 0i)$
$= 64 + 0i$

(13) $\ln(x) + \ln(2x+8) = \ln(90)$
$\ln(x(2x+8)) = \ln(90)$
$x(2x+8) = 90$
$2x^2 + 8x = 90$
$2x^2 + 8x - 90 = 0$
$x^2 + 4x - 45 = 0$
$(x + 9)(x - 5) = 0$
$x = -9$, reject $x = 5$

(14) $y = \frac{3x}{\sqrt{3x+9}}$

$3x + 9 > 0$
$3x > -9$
Domain: $x > -3$