Period 5 Questions
Exam 1B

$\frac{1}{3} + \frac{2}{3}$ $\quad\quad$ $\frac{1}{3} - \frac{1}{3}$

④ $A = \begin{bmatrix} -2 & 4 \\ -4 & -4 \end{bmatrix}$ $\quad$ $B = \begin{bmatrix} -\frac{1}{6} & -\frac{1}{6} \\ \frac{1}{6} & -\frac{1}{12} \end{bmatrix}$

Plan: $AB = BA = I_2$

yes

$AB = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ $\quad$ $BA = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

8B

Plan: $X = A^{-1} \cdot B$

$6x - 5y = 1$
$8x - 7y = -1$

$$\underset{A}{\begin{bmatrix} 6 & -5 \\ 8 & -7 \end{bmatrix}} \cdot \underset{X}{\begin{bmatrix} x \\ y \end{bmatrix}} = \underset{B}{\begin{bmatrix} 1 \\ -1 \end{bmatrix}}$$

$\det(A) = -42 - (-40) = -2$

$$A^{-1} = \frac{1}{-2}\begin{bmatrix} -7 & 5 \\ -8 & 6 \end{bmatrix} = \begin{bmatrix} \frac{7}{2} & \frac{-5}{2} \\ 4 & -3 \end{bmatrix}$$

$$X = A^{-1} \cdot B = \begin{bmatrix} 6 \\ 7 \end{bmatrix} \qquad x = 6 \quad y = 7$$

Exam

$(h, 1)$

2A

⑥ $(3-h)^2 + (3-1)^2 = (6-h)^2 + (6-1)^2$

$\cancel{h^2} - 6h + 9 + 4 = \cancel{h^2} - 12h + 36 + 25$

$6h = 48$

$h = 8$

plug in $(3,3)$

$(x-8)^2 + (y-1)^2 = r^2$

$(3-8)^2 + (3-1)^2 = r^2$

$25 + 4 = r^2$

$29 = r^2$

$(x-8)^2 + (y-1)^2 = 29$

⑤ A $x^2 + y^2 + 8x - 2y - 83 = 0$ (QII) $x = -10$

$x^2 + 8x + 16 + y^2 - 2y + 1 = 83 + 16 + 1$

$(x+4)^2 + (y-1)^2 = 100$

$x = -10$

$(-10+4)^2 + (y-1)^2 = 100$

$(y-1)^2 = 64$

$y - 1 = \pm 8$

$y = 1 \pm 8$ → 9, −7

Center: $(-4, 1)$

pt: $(-10, 9)$

$m_{radius} = \frac{9-1}{-10-(-4)} = \frac{8}{-6} = -\frac{4}{3}$

$m_{tan} = \frac{3}{4}$

$y - 9 = \frac{3}{4}(x+10)$

Exam 3

9B

$$\log \sqrt[3]{\frac{(A^3B)^2}{C}}$$

$$\log \left(\frac{(A^3B)^2}{C}\right)^{\frac{1}{3}}$$

$$\frac{1}{3}\log\left(\frac{A^6B^2}{C}\right)$$

$$\frac{1}{3}\left[\log A^6B^2 - \log C\right]$$

$$\frac{1}{3}\left[\log A^6 + \log B^2 - \log C\right]$$

$$\frac{1}{3}\left[6\log A + 2\log B - \log C\right]$$

or

$$2\log A + \frac{2}{3}\log B - \frac{1}{3}\log C$$

11 B

$$\ln(x+2) - \ln(4-x) = 2$$

$$\ln \frac{x+2}{4-x} = 2$$

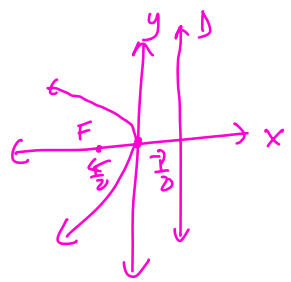
$$e^2 = \frac{x+2}{4-x}$$

$$4e^2 - xe^2 = x+2$$

$$4e^2 - 2 = x + xe^2$$

$$4e^2 - 2 = x(1+e^2)$$

$$\frac{4e^2-2}{1+e^2} = x$$



10 (B) $-2y^2 = x$ $\qquad y^2 = -\frac{1}{2}x$

vertex: (0,0)

$-\frac{1}{2} = 4p$

$-1 = 8p$

$p = -\frac{1}{8}$

focus: $(-\frac{1}{8}, 0)$

directrix $x = \frac{1}{8}$

7 A

$$\sqrt{2x+3} + \sqrt{x+2} = 2$$

$$\sqrt{2x+3} = 2 - \sqrt{x+2}$$

$$2x+3 = 4 - 4\sqrt{x+2} + x + 2$$

$$x - 3 = -4\sqrt{x+2}$$

$$x^2 - 6x + 9 = 16(x+2)$$

$$x^2 - 6x + 9 = 16x + 32$$

$$x^2 - 22x - 23 = 0$$

$$(x-23)(x+1) = 0$$

$x = \cancel{23}, -1$

reject

$x \geq -\frac{3}{2}$

$x \geq -2$

$2 - \sqrt{x+2} \geq 0$

$2 \geq \sqrt{x+2}$

$4 \geq x + 2$

$2 \geq x$

$x \leq 2$

$x - 3 \leq 0$

$x \leq 3$

fr: $[-\frac{3}{2}, 2]$

10 (B) $\log_3(8x^3 - 1) - \log_3(4x^2 + 2x + 1) = 2$

$$\log_3 \frac{(2x-1)(\cancel{4x^2+2x+1})}{\cancel{4x^2+2x+1}} = 2$$

$$\log_3(2x-1) = 2$$

$$3^2 = 2x - 1$$

$$10 = 2x$$

$$5 = x$$

Period 9 Questions

Exam 1

11 A

$$\begin{vmatrix} 4x-3 & x-7 \\ x+1 & x+2 \end{vmatrix} = 21$$

$$(4x-3)(x+2) - (x-7)(x+1) = 21$$

$$4x^2+5x-6-(x^2-6x-7) = 21$$

$$3x^2+11x+1 = 21$$

$$3x^2+11x-20 = 0$$

$$(3x-4)(x+5) = 0$$

$$x = \frac{4}{3}, -5$$

(8) A

$$5x+6y = 3$$
$$-3x-2y = -5$$

Plan: $X = A^{-1} \cdot B$

$$\underset{A}{\begin{bmatrix} 5 & 6 \\ -3 & -2 \end{bmatrix}} \cdot \underset{X}{\begin{bmatrix} x \\ y \end{bmatrix}} = \underset{B}{\begin{bmatrix} 3 \\ -5 \end{bmatrix}}$$

$\det(A) = -10-(-18) = 8$

$$A^{-1} = \frac{1}{8}\begin{bmatrix} -2 & -6 \\ 3 & 5 \end{bmatrix} = \begin{bmatrix} -\frac{1}{4} & -\frac{3}{4} \\ \frac{3}{8} & \frac{5}{8} \end{bmatrix}$$

$$X = A^{-1}B = \begin{bmatrix} 3 \\ -2 \end{bmatrix} \qquad x = 3 \quad y = -2$$

4 A

$$A = \begin{bmatrix} -2 & 4 \\ -4 & -4 \end{bmatrix} \qquad B = \begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{1}{2} & \frac{1}{4} \end{bmatrix}$$

$-1 + 2$

$-\frac{1}{2} + 1$

Plan: $AB = BA = I_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$\begin{bmatrix} 1 & \frac{1}{2} \end{bmatrix}$ not inverses

Exam 2

② A $\frac{x^2}{10} - \frac{y^2}{15} = 1$ HTA

$a^2 = 10 \quad a = \sqrt{10}$

$b^2 = 15 \quad b = \sqrt{15}$

$c^2 = 25$

$c = 5$

Center: $(0,0)$

Foci: $(\pm 5, 0)$

A

⑤ $x^2 + y^2 + 8x - 2y - 83 = 0$ $x = -10$

$x^2 + 8x + 16 + y^2 - 2y + 1 = 83 + 16 + 1$

$(x+4)^2 + (y-1)^2 = 100$ Center: $(-4, 1)$

$x = -10$ $(-10+4)^2 + (y-1)^2 = 100$ QII

$(y-1)^2 = 64$

$y - 1 = \pm 8$ (9, ~~−7~~)

$y = 1 \pm 8$

$(-10, 9)$

m radius: $\frac{9-1}{-10-(-4)} = \frac{8}{-6} = \frac{4}{-3}$

m tan = $\frac{3}{4}$

$y - 9 = \frac{3}{4}(x+10)$

Exam 3

9A

$$\log \sqrt[3]{\frac{(A^4B)^2}{C}}$$

$$\log \left(\frac{(A^4B)^2}{C}\right)^{\frac{1}{3}}$$

$$\frac{1}{3}\log\left(\frac{A^8B^2}{C}\right)$$

$$\frac{1}{3}\left(\log A^8B^2 - \log C\right)$$

$$\frac{1}{3}\left(\log A^8 + \log B^2 - \log C\right)$$

$$\frac{1}{3}\left(8\log A + 2\log B - \log C\right)$$

11A $\ln(x-2) - \ln(4-x) = 2$

$$\ln \frac{x-2}{4-x} = 2$$

$$e^2 = \frac{x-2}{4-x}$$

$$4e^2 - xe^2 = x - 2$$

$$4e^2 + 2 = x + xe^2$$

$$4e^2 + 2 = x(1+e^2)$$

$$\frac{4e^2+2}{1+e^2} = x$$

(8) A

$$\log_4(2x+3) = 2 + \log_4 x$$

$$\log_4(2x+3) - \log_4 x = 2$$

$$\log_4 \frac{2x+3}{x} = 2$$

$$4^2 = \frac{2x+3}{x}$$

$$16 = \frac{2x+3}{x}$$

$$16x = 2x+3$$

$$14x = 3$$

$$x = \frac{3}{14}$$

(7)

$$\sqrt{2x+3} + \sqrt{x+2} = 2$$

$x \geq -\frac{3}{2}$ $x \geq -2$

$$\sqrt{2x+3} = 2 - \sqrt{x+2}$$

$2 - \sqrt{x+2} \geq 0$

$2 \geq \sqrt{x+2}$

$4 \geq x+2$

$2 \geq x$

$x \leq 2$

$$2x+3 = 4 - 4\sqrt{x+2} + x + 2$$

$$x - 3 = -4\sqrt{x+2}$$

$x - 3 \leq 0$

$x \leq 3$

$$x^2 - 6x + 9 = 16(x+2)$$

$$x^2 - 6x + 9 = 16x + 32$$

$$x^2 - 22x - 23 = 0$$

$$(x-23)(x+1) = 0$$

$x = 23, -1$

fr: $[-\frac{3}{2}, 2]$

(15) A

$$(\ln x-2)^3+(\ln x-2)^2=4(\ln x-2)+4$$

let $y=\ln x$

$$y^3+y^2=4y+4$$

$$y^3+y^2-4y-4=0$$

$$y^2(y+1)-4(y+1)=0$$

$$(y^2-4)(y+1)=0$$

$$y=\pm 2,\ -1$$

$\ln x-2=2$	$\ln x-2=-2$	$\ln x-2=-1$
$\ln x=4$	$\ln x=0$	$\ln x=1$
$e^4=x$	$x=e^0=1$	$x=e$