Today's Plan:

Learning Target (standard): I will review for the semester exam.

Students will: Complete practice problems over previous concepts at the boards and study for my exam.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuarcy and provide students feedback, describe and provide examples of exam problems.

Assessment: Board work

Differentiation: Students will work at the board, actively engage in practice review concepts with the aid of other students and the teacher.

Use synthetic division to tell whether the given value is a zero of the function. Write the quotient and remainder.

$f(x) = x^4 + 3x^3 - 21x^2 - 22x - 19; x = -6$ $(x+6)$

$$\begin{array}{r|rrrrr} -6 & 1 & 3 & -21 & -22 & -19 \\ & & -6 & 18 & 18 & 24 \\ \hline & 1 & -3 & -3 & -4 & 5 \end{array}$$

$x^3 - 3x^2 - 3x - 4 + \frac{5}{x+6}$

∴ By synthetic division, $x=-6$ is not a zero of $f(x)$ because there is a remainder of 5.

Factor and find all zeros.

$$f(x)=6x^5+3x^4-2x^3-x^2-8x-4$$

$f(x)=3x^4(2x+1)-x^2(2x+1)-4(2x+1)$

$f(x)=(2x+1)(3x^4-x^2-4)$

$x^2+1=0$, $x^2=-1$

$3x^2-4=0$, $3x^2=4$, $x^2=\frac{4}{3}$, $x=\frac{2}{\sqrt{3}},\frac{-2}{\sqrt{3}}$

$f(x)=(2x+1)(3x^2-4)(x^2+1)$

$f(x)=(2x+1)(\sqrt{3}x+2)(\sqrt{3}x-2)(x+i)(x-i)$

Zeros: $x=-\frac{1}{2},-\frac{2\sqrt{3}}{3},\frac{2\sqrt{3}}{3},-i,i$

Board Practice

Evaluate each determinant.

1) $\begin{vmatrix}-4 & 5\\ -1 & -3\end{vmatrix}$ $=12+5$

$D=17$

2) $\begin{vmatrix}4 & 5 & -1\\ 3 & 5 & -4\\ -4 & 0 & -1\end{vmatrix}$

$=4\begin{vmatrix}5 & -4\\ 0 & -1\end{vmatrix}-5\begin{vmatrix}3 & -4\\ -4 & -1\end{vmatrix}-1\begin{vmatrix}3 & 5\\ -4 & 0\end{vmatrix}$

$=4(-5-0)-5(-3-16)-1(0+20)$

$=-20+95-20$

$D=55$

Simplify. Write "undefined" for expressions that are undefined.

3) $[-3\ \ 1\ \ 2\ \ -6]+[0\ \ -3\ \ 2\ \ -6]-[2\ \ -5\ \ -4\ \ 0]$

$[-1\ \ -7\ \ 0\ \ -12]$

4) $-4\left(\begin{bmatrix}-3 & -4 & 3\\ -3 & 2 & 4\end{bmatrix}+\begin{bmatrix}2 & -6 & -4\\ -6 & 0 & -2\end{bmatrix}\right)$

$-4\begin{bmatrix}-1 & -10 & -1\\ -9 & 2 & 2\end{bmatrix}$

$\begin{bmatrix}4 & 40 & 4\\ 36 & -8 & -8\end{bmatrix}$

5) $\begin{bmatrix}6 & -2\\ -5 & 1\end{bmatrix}\begin{bmatrix}3 & 1\\ -4 & -5\end{bmatrix}$

$(2\times2)(2\times2)=2\times2$

$=\begin{bmatrix}18+8 & 6+10\\ -15-4 & -5-5\end{bmatrix}$

$=\begin{bmatrix}26 & 16\\ -19 & -10\end{bmatrix}$

6) $\begin{bmatrix} 3 & -2 \end{bmatrix} \cdot \begin{bmatrix} -5 & 5 & -4 \\ -2 & 6 & 3 \end{bmatrix} \cdot \begin{bmatrix} 1 & -2 \\ -5 & -4 \\ 3 & 5 \end{bmatrix}$

$(1\times2)(2\times3)=1\times3$

$\begin{bmatrix} -15+4 & 15-12 & -12-6 \end{bmatrix}$

$\begin{bmatrix} -11 & 3 & -18 \end{bmatrix}$

$\begin{bmatrix} -11 & 3 & -18 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ -5 & -4 \\ 3 & 5 \end{bmatrix}$

$(1\times3)(3\times2) = 1\times2$

$= \begin{bmatrix} -11-15-54 & 22-12-90 \end{bmatrix}$

$= \begin{bmatrix} -80 & -80 \end{bmatrix}$

Find the inverse of each matrix.

7) $\begin{bmatrix} 8 & 3 \\ -3 & 5 \end{bmatrix}$ $D = 40+9$ $D = 49$

8) $\begin{bmatrix} -8 & 9 \\ 0 & 7 \end{bmatrix}$

$\left[\begin{array}{cc|cc} 8 & 3 & 1 & 0 \\ -3 & 5 & 0 & 1 \end{array}\right] \rightarrow \left[\begin{array}{cc|cc} 1 & \frac{3}{8} & \frac{1}{8} & 0 \\ -3 & 5 & 0 & 1 \end{array}\right] \rightarrow \left[\begin{array}{cc|cc} 1 & \frac{3}{8} & \frac{1}{8} & 0 \\ 0 & \frac{49}{8} & \frac{3}{8} & 1 \end{array}\right]$

$3 \quad \frac{9}{8} \quad \frac{3}{8} \quad 0$

Use Cramer's Rule to solve each system.

9) $2x + y = -10$
$-2x - 2y = 12$

10) $2x + 2z = -10$
$6x + y + 6z = 4$
$-x - 2y - z = 4$