NO CALCULATORS ALLOWED
SHOW PROPER WORK & SIMPLIFY ALL ANSWERS
PUT A BOX AROUND EACH FINAL ANSWER

If $f(x) = 3x^4 + 20x^3 - 2x^2 + 37x + 22$, find $f(-7)$ using synthetic division. **SCORE: ______ / 3 PTS**

$$\begin{array}{r|rrrrr} -7 & 3 & 20 & -2 & 37 & 22 \\ & & -21 & 7 & -35 & -14 \\ \hline & 3 & -1 & 5 & 2 & \boxed{8} \end{array}$$

$f(-7) = 8$

Consider the polynomial $f(x) = x^3 - 6x^2 - 13x + 42$. **SCORE: ______ / 5 PTS**

[a] List all the possible integer zeros of f.

$\pm 1, \pm 2, \pm 3, \pm 6, \pm 7, \pm 14, \pm 21, \pm 42$

[b] Factor $f(x)$ completely.

$$\begin{array}{r|rrrr} 2 & 1 & -6 & -13 & 42 \\ & & 2 & -8 & -42 \\ \hline & 1 & -4 & -21 & \boxed{0} \end{array}$$

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

Write 3 statements which are equivalent to the following statement, as shown in lecture. **SCORE: ______ / 3 PTS**

"-3 is a zero/root of $f(x) = 2x^3 - 11x + 21$"

[a] $f(-3) = 0$

[b] $x+3$ IS A FACTOR OF $f(x)$

[c] $(-3,0)$ IS AN X-INTERCEPT OF $y = f(x)$

Fill in the blank **USING THE REMAINDER THEOREM**: **SCORE: ______ / 1 PT**

If the remainder when $f(x) = 3x^5 - 19x^4 + 1300$ is divided by $x - 6$ is 4, then $f(6) = 4$

Find the value of i^{9771}. **You must show how you got your answer to earn any credit.** **SCORE: ______ / 1 PT**

$4 \overline{)71}$ 17 r 3

$i^3 = -i$

Divide $\dfrac{4+5i}{-2+3i}$ and write your final answer in standard form. **SCORE: ______ / 3 PTS**

$$\frac{4+5i}{-2+3i} \cdot \frac{-2-3i}{-2-3i} = \frac{-8-12i-10i-15i^2}{4-9i^2}$$

$$= \frac{-8-22i+15}{4+9}$$

$$= \frac{7-22i}{13} = \frac{7}{13} - \frac{22}{13}i$$

Use long division to divide $\dfrac{-4x^4 + 6x^3 + x}{2x^2 - 4x + 1}$. **SCORE: ______ / 4 PTS**

$$\begin{array}{r} -2x^2 - x - 1 \\ 2x^2-4x+1 \overline{)\,-4x^4+6x^3+0x^2+x+0} \\ \pm 4x^4 \mp 8x^3 \pm 2x^2 \quad\quad \\ \hline -2x^3+2x^2+x \quad \\ \pm 2x^3 \mp 4x^2 \pm x \quad \\ \hline -2x^2+2x+0 \\ \pm 2x^2 \mp 4x \pm 1 \\ \hline -2x+1 \end{array}$$

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