Short Answer Section

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	1	−3	1	5	−6
1		1	−2	−1	4
multiply →	1	−2	−1	4	**−2** ← Remainder

add

$x^3 - 2x^2 - x + 4$: Quotient

Quotient $= x^3 - 2x^2 - x + 4$

Remainder $= -2$

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Find Horizontal Asymptote :

- deg top > deg bottom → No H.A
- deg top = deg bottom → $y = \frac{a}{b}$ (a → leading coeff., b → leading coeff.)
- deg top < deg bottom → $y = 0$

$$f(x) = \frac{5x^4 + 9x - 5}{x^2 - 5}$$

deg top $= 4 > 2 =$ deg bottom : **No H.A.**

(15) $\log_b(yz^9) = \log_b y + \log_b z^9$

product rule

$= \boxed{\log_b y + 9\log_b z}$

power rule

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(16) $3^{3x-6} = 27$

$3^{3x-6} = 3^3$ (Rewrite so that both sides have same bases)

$3x - 6 = 3$ (Set exponents equal)

$3x = 9$ (Add 6)

$\boxed{x = 3}$ (Divide by 3)

Essay Section

(17) $\log_6 x + \log_6 (x-35) = 2$

$\log_6 [x \cdot (x-35)] = 2$ (Use product rule to combine left side into a single logarithm)

6: base; $x \cdot (x-35)$: quantity; 2: exponent

$x \cdot (x-35) = 6^2$ (Use definition of logarithm)

$x \cdot (x-35) = 36$ (Simplify)

$x^2 - 35x - 36 = 0$ (Distribute and subtract 36)

$(x-36)(x+1) = 0$ (Factor)

$x - 36 = 0$; $x + 1 = 0$

$x = 36$; $x = -1$

Check Solutions:

$x = 36$: a solution

$\log_6 36 + \log_6 (36-35) \stackrel{?}{=} 2$

$2 + \log_6 1 = 2$ True

$\log_6 1 = 0$

~~$x = -1$~~: $\log_6(-1) + \log_6(-1-35) \stackrel{?}{=} 2$

Not a solution

You cannot have negative quantities inside log.

Conclusion: Solution set $\{36\}$

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(18)

$$e^{x+6} = 4$$

$\ln(e^{x+6}) = \ln 4$ (Take ln of both sides)

$x + 6 = \ln 4$ (Use property: $\ln e^M = M$)

$x = \ln 4 - 6$ (Subtract 6)