Q3 E2 a. $9/2 = 4$ R1
$4/2 = 2$ R0
$2/2 = 1$ R0
$1/2 = 0$ R1

$.5 \cdot 2 = 0 + 1$

$9.5_{10} = 1001.1_2 = \boxed{+1.0011 \cdot 2^3}$

b. $9/2 = 4$ R1
$4/2 = 2$ R0
$2/2 = 1$ R0
$1/2 = 0$ R1

$.6 \cdot 2 = .2 + 1$
$.2 \cdot 2 = .4 + 0$
$.4 \cdot 2 = .8 + 0$
$.8 \cdot 2 = .6 + 1$

$\boxed{+1.001\overline{1001} \cdot 2^3}$

c. $1000/2 = 500$ R0
$500/2 = 250$ R0
$250/2 = 125$ R0
$125/2 = 62$ R1
$62/2 = 31$ R0
$31/2 = 15$ R1
$15/2 = 7$ R1
$7/2 = 3$ R1
$3/2 = 1$ R1
$1/2 = 0$ R1

$.2 \cdot 2 = .4 + 0$
$.4 \cdot 2 = .8 + 0$
$.8 \cdot 2 = .6 + 1$
$.6 \cdot 2 = .2 + 1$

$\boxed{+1.1110100\overline{0011} \cdot 2^3}$

d. $6/2 = 3$ R0
$3/2 = 1$ R1
$1/2 = 0$ R1

$.2857\ldots \cdot 2 = .5714\ldots + 0$
$.5714\ldots \cdot 2 = .1429\ldots + 1$
$.1429\ldots \cdot 2 = .2857\ldots + 0$
$.2857\ldots$

$\boxed{+1.\overline{10010} \cdot 2^2}$

Q4 E1c if x is close to 0 or $x \gg 1$ or $x \ll 1$ there will be a loss of significance rewrite as

$$\frac{1-x}{(1-x)(1+x)} - (1-x)$$

Liam Hood | Aero 300 | HW 1

0.1 E2 a. $P(x) = 7 - 3x + 2x^2 + 6x^3$

$7 + x(-3 - 2x + 6x^2)$

$7 + x(-3 + x(-2 + x(6)))$

$P(\frac{1}{2}) = 7 - \frac{1}{2}(-3 - \frac{1}{2}(-2 - \frac{1}{2}(6))) = 7 - \frac{1}{2}(-3 - \frac{1}{2}(-2 - 3))$

$= 7 - \frac{1}{2}(-3 + \frac{5}{2}) = 7 - \frac{1}{2}(-\frac{1}{2}) = 7 + \frac{1}{4} =$ **7.25**

b. $P(x) = 1 - 3x + x^2 - 3x^3 - x^4 + 8x^5$

$= 1 + x(-3 + x(1 + x(-3 + x(-1 + x(8)))))$

$P(\frac{1}{2}) = 1 + \frac{1}{2}(-3 + \frac{1}{2}(1 + \frac{1}{2}(-3 + \frac{1}{2}(-1 + \frac{1}{2}(8)))))$

$-\frac{3}{2}$

$\frac{1}{4}$

$-\frac{23}{8}$

$= 1 - \frac{23}{16}$

$P(\frac{1}{2}) = -\frac{7}{16} =$ **-.4375**

c. $P(x) = 4 - 2x - 2x^4 + 4x^6$

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

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

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

$P(\frac{1}{2}) = 4 - \frac{1}{2}(-2 - \frac{1}{2}(-\frac{1}{2}(-\frac{1}{2}(-2 - \frac{1}{2}(\frac{1}{2}(4))))))$

$= 4 - \frac{1}{2}(-2 - \frac{1}{8}(-2 + 1))$

$= 4 - \frac{1}{2}(-\frac{15}{8})$

$P(\frac{1}{2}) = 4 + \frac{15}{16} =$ **4.9375**

0.1 E6 a. The best way to evaluate would be to evaluate x^5 than Horner's method, using x^5 instead of x. This uses 10 operations

$P(x) = a_0 + x^5(a_5 + x^5(a_{10} + x^5(a_{15})))$ $\quad x^5 = x \cdot x \cdot x \cdot x \cdot x$

1 2 3 4 5 6 + 4

b. Best to evaluate as previous but must divide out x^2 to begin

$P(x) = x \cdot x \cdot x^5(a_7 + x^5(a_{12} + x^5(a_{17} + x^5(a_{22} + x^5(a_{27})))))$ $\quad x^5$

1 2 3 4 5 6 7 8 9 10 11 4 4

This uses 15 operations

0.2 E5 $(\pi)_{10} = (X)_2$

$3 \div 2 = 1$ R1

$1 \div 2 = 0$ R1

$X =$ **11.001001000011**

.141592... · 2 = .283185... +0

.283185... · 2 = .566370... +0

.566370... · 2 = .132741... +1

.132741... · 2 = .265482... +0

.265482... · 2 = .530964... +0

.530964... · 2 = .061929... +1

.061929... · 2 = .123859... +0

.123859... · 2 = .247719... +0

.247719... · 2 = .495438... +0

.495438... · 2 = .990877... +0

.990877... · 2 = .981754... +1

.981754... · 2 = .963507... +1

.963507... · 2 = .927018... +1