4.1

2) Assume $m$ and $n$ are particular INT

A) Is $6m+8n$ even; yes, $2(3m+4n)$

B) Is $10mn+7$ odd: yes,
$10mn+7 = 10mn+6+1$ $2(5mn+3)+1$

C) If $m>n>0$, is $m^2-n^2$ composite; No,
$m=2$ $n=1$ $(2)^2-(1)^2=3$

4) There are INT $m$ & $N$ such that
$m>1$ & $N>1$ and $\frac{1}{m}+\frac{1}{n}$ is an INT
Let $m=N=2$

14) $(a+b)^2 = a^2+b^2$; True for some INT
True for 1,0; Not 2,3

20) for all INT $m$, if $m>1$ then $0<\frac{1}{m}<1$
if $m$ is an INT $>1$ then $0<\frac{1}{m}<1$

25) The dif of any even INT - any odd INT is odd
$m=2k$ For some INT $k$
$n=2q+1$ For some INT $q$
$m-n = 2k-(2q+1)$
$= 2k-2q-1$ $m-N$ is an odd INT
$= 2k-2q-2+1$
$= 2(k-q-1)+1$

29) For all INT $N$, if $n$ is odd then $3n+5$ is even
$a=2k+1$
$3a+5 = 3(2k+1)+5$
$= 6k+3+5$ $3a+5$ is even
$= 6k+8$
$= 2(3k+4)$

4.2

6) $320.549249\overline{2492}$

$1{,}000{,}000x = 320549249.\overline{249}$

$-\quad 1{,}000x = 320549.\overline{249}$

$999{,}000x = 320{,}228{,}700$

$x = \frac{320{,}228{,}700}{999{,}000} = \frac{3202287}{9990}$

9) Assume a and b are 6th INT and that $a \neq 0$ and $b \neq 0$ $(b-a)/(ab^2)$

$ab^2 \neq 0$; quotient of two INTs

21) If m is any even INT and n is any odd INT, then $m^2 + 3n$ is odd. True, the sum of any odd INT and any Even INT is odd