

# MATH4350

## Homework Assignment

Joel Savitz

Wednesday 8 July 2020

1. Use the Egyptian method of doubling to find the following products:

2.3 Problems 1							
(a) $18 \cdot 25$		(b) $26 \cdot 33$		(c) $21 \cdot 85$		(d) $59 \cdot 105$	
✓ 1	25	✓ 1	33	✓ 1	85	✓ 1	105
2	50	✓ 2	66	2	170	✓ 2	210
4	100	4	132	✓ 4	340	4	420
8	200	✓ 8	264	8	680	✓ 8	840
✓ 16	400	✓ 16	528	✓ 16	1360	✓ 16	1680
19	450	26	858	21	1785	✓ 32	3360
						59	6195

2. Find, in the Egyptian fashion, the following quotients:

2.3 Problems 2		(c) $47 \div 9$	(d) $1060 \div 12$	(e) $61 \div 8$
(a) $184 \div 8$	(b) $19 \div 8$	$\begin{array}{r} \sqrt{1} \quad 9 \\ \sqrt{2} \quad 18 \\ \sqrt{4} \quad 36 \\ \frac{2}{3} \quad 6 \\ \frac{1}{3} \quad 3 \\ \frac{1}{6} + \frac{1}{18} \quad 2 \\ \hline 5 + \frac{1}{6} + \frac{1}{18} \quad 47 \\ \Rightarrow 47 \div 9 = 5 + \frac{1}{6} + \frac{1}{18} \end{array}$	$\begin{array}{r} \sqrt{1} \quad 12 \\ \sqrt{2} \quad 24 \\ \sqrt{4} \quad 48 \\ \sqrt{8} \quad 96 \\ \sqrt{16} \quad 192 \\ \sqrt{32} \quad 384 \\ \sqrt{64} \quad 768 \\ \frac{2}{3} \quad 8 \\ \sqrt{\frac{1}{3}} \quad 4 \\ \hline 88 + \frac{1}{3} \quad 1060 \\ \Rightarrow 1060 \div 12 = 88 + \frac{1}{3} \end{array}$	$\begin{array}{r} \sqrt{1} \quad 8 \\ \sqrt{2} \quad 16 \\ \sqrt{4} \quad 32 \\ \sqrt{\frac{1}{2}} \quad 4 \\ \sqrt{\frac{1}{4}} \quad 2 \\ \sqrt{\frac{1}{8}} \quad 1 \\ \hline 7 + \frac{1}{2} + \frac{1}{8} \quad 61 \\ \Rightarrow 61 \div 8 = 7 + \frac{1}{2} + \frac{1}{8} \end{array}$
$\begin{array}{r} \sqrt{1} \quad 8 \\ \sqrt{2} \quad 16 \\ \sqrt{4} \quad 32 \\ \sqrt{8} \quad 64 \\ \sqrt{16} \quad 128 \\ \hline \textcircled{23} \quad 184 \\ \Rightarrow 184 \div 8 = 23 \end{array}$	$\begin{array}{r} \sqrt{1} \quad 8 \\ \sqrt{2} \quad 16 \\ \frac{1}{2} \quad 4 \\ \sqrt{\frac{1}{4}} \quad 2 \\ \sqrt{\frac{1}{8}} \quad 1 \\ \hline 2 + \frac{1}{4} + \frac{1}{8} \quad 19 \\ \Rightarrow 19 \div 8 = 2 + \frac{1}{4} + \frac{1}{8} \end{array}$			

3. Use the Egyptian method of multiplication to calculate the following products:

2.5 Problems / 3

(a)  $(11 + \frac{1}{2} + \frac{1}{8}) \cdot 37$

1	$11 + \frac{1}{2} + \frac{1}{8}$
2	$22 + 1 + \frac{1}{4}$
4	$44 + 2 + \frac{1}{2}$
8	$88 + 4 + 1$
16	$176 + 8 + 2$
32	$352 + 16 + 4$
37	$407 + (18 + \frac{1}{2}) + (4 + \frac{1}{8} + \frac{1}{2})$
37	$430 + \frac{1}{8}$

(b)  $(1 + \frac{1}{2} + \frac{1}{4})(9 + \frac{1}{2} + \frac{1}{4})$

1	$1 + \frac{1}{2} + \frac{1}{4}$
2	$2 + 1 + \frac{1}{2}$
4	$4 + 2 + 1$
8	$8 + 4 + 2$
$\frac{1}{2}$	$\frac{1}{2} + \frac{1}{4} + \frac{1}{8}$
$\frac{1}{4}$	$\frac{1}{4} + \frac{1}{8} + \frac{1}{16}$
$9 + \frac{1}{2} + \frac{1}{4}$	$(18 + \frac{1}{2} + \frac{1}{4}) + (\frac{1}{2} + \frac{1}{4} + \frac{1}{8}) + (\frac{1}{4} + \frac{1}{8} + \frac{1}{16})$
$9 + \frac{1}{2} + \frac{1}{4}$	$17 + \frac{1}{16}$

(c)  $(2 + \frac{1}{4})(1 + \frac{1}{2} + \frac{1}{4})$

1	$1 + \frac{1}{2} + \frac{1}{4}$
2	$2 + 1 + \frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{2} + \frac{1}{4} + \frac{1}{8}$
$\frac{1}{4}$	$\frac{1}{4} + \frac{1}{8} + \frac{1}{16}$
$2 + \frac{1}{4}$	$3 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16}$

9. Verify that:  $\frac{2}{n} = \frac{1}{n} + \frac{1}{2n} + \frac{1}{3n} + \frac{1}{6n}$  and decompose  $\frac{2}{101}$  accordingly:

