

## HW 1

1a)

divisible by 2, since it ends in 0

divisible by 3, since the sum of digits is 18, which is divisible by 3

not divisible by 4, since 30 is not divisible by 4

divisible by 5, since it ends in 0

divisible by 6, since it is divisible by both 2 and 3

not divisible by 8, since it's not divisible by 4

divisible by 9, since the sum of digits is 18, which is divisible by 9

divisible by 10, since it ends in 0

divisible by 11, since the sum of the odd digits (9) minus the sum of the even digits (9) is 0, which is divisible by 11

not divisible by 12, since it is not divisible by 4

1b)

divisible by 2, since it ends in 8

not divisible by 3, since the sum of digits is 35, which is not divisible by 3

divisible by 4, since 48 is divisible by 4

not divisible by 5, since it ends in 8

not divisible by 6, since it is not divisible by 3

divisible by 8, since 248 is divisible by 8 ( $248 = 8 * 31$ )

not divisible by 9, since it is not divisible by 3

not divisible by 10, since it ends in 8

not divisible by 11, since the sum of odd digits (25) minus even digits (10) is 15, which is not divisible by 11

not divisible by 12, since it is not divisible by 3

2) The sum, 8,563,243, equals  $(703 * 7201) + (703 * 4980) = 703 * (7201 + 4980) = 703 * 12181$ , so by definition, 8,563,243 is divisible by 703

The difference, 1,561,363, equals  $(703 * 7201) - (703 * 4980) = 703 * (7201 - 4980) = 703 * 2221$ , so by definition, 1,561,363 is divisible by 703

3)

The number  $33,390,334 = 19 * 1957 * 898 = 898 * (19 * 1957) = 898 * 37183$ , so by definition, 33,390,334 is divisible by 898.

The number  $33,390,334 = 19 * 1957 * 898 = 1957 * (19 * 898) = 1957 * 17062$ , so by definition, 33,390,334 is divisible by 1957

4a) Not prime, divisible by 7  
 b) Not prime, divisible by 3  
 c) Not prime, divisible by 5  
 d) Not prime, divisible by 11  
 e) Prime. The square root of 521 is about 23. We check all primes up to and including 23:  
 521 is not divisible by 2, since it ends in 1  
 521 is not divisible by 3, since its digits add to 8, which is not divisible by 3  
 521 is not divisible by 5, since it ends in 1  
 521 is not divisible by 7, we just check it: 521 divided by 7 is 74 remainder 3  
 521 is not divisible by 11, since the odd-place digits add to 6, and the even-place digits add to 2, and  $6 - 2 = 4$ , which is not divisible by 11  
 521 is not divisible by 13, we just check it: 521 divided by 13 is 40 remainder 1  
 521 is not divisible by 17, we just check it: 521 divided by 17 is 30 remainder 11  
 521 is not divisible by 19, we just check it: 521 divided by 19 is 27 remainder 8  
 521 is not divisible by 23, we just check it: 521 divided by 23 is 22 remainder 15

HW 2:

1) The primes are 101, 103, 107, 109, 113, 127, 131, 137, 139, 149

2)a) not prime,  $6887 = 71 * 97$   
 b) not prime,  $6889 = 83 * 83$   
 c) not prime, 6891 is divisible by 3  
 d) not prime,  $6893 = 61 * 113$   
 e) prime, it is not divisible by 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, or 83

3)  $330 = 2 * 3 * 5 * 11$   
 Factors: 1, 2, 3, 5, 6, 10, 11, 15, 22, 30, 33, 55, 66, 110, 165, 330

4) 2003 is prime  
 Factors: 1, 2003

5)  $1207 = 17 * 71$   
 Factors: 1, 17, 71, 1207

6)  $999 = 3^3 * 37$   
 Factors: 1, 3, 9, 27, 37, 111, 333, 999

7)  $406 = 2 * 7 * 29$   
 Factors: 1, 2, 7, 14, 29, 58, 203, 406

### HW 3

1a)  $C(n) = 130 + 38n$

b) 320 cars

c) 415 cars

d) 1.84 hours after noon (about 1:51 PM)

e) 4.47 hours after noon (about 4:24 PM)

2a)  $F(n) = 2.3 + 1.1n$

b) 33.1 mm

c) 10.6 mm

d) 5.18 weeks

e) 23.5 weeks

3a)  $F(n) = 9.091n + 232.5$

b) 242 followers

c) 9.091 followers per day

d) about September 7

e) about October 5 ( $n = 35$ )

4a)  $P(n) = -0.0158n + 3.279$

b) 2.805 million people

c) losing 15,800 people per year

d) about 2018

### HW 4

1a)  $B_n = 20(7)^n$

b) 6860 bacteria

c) 807,000,000 bacteria

d) 4.4 days

e) 7.9 days

## HW 6

1)  $1 + 9x + 36x^2 + 84x^3 + 126x^4 + 126x^5 + 84x^6 + 36x^7 + 9x^8 + x^9$

2a)  $126/512$

b)  $84/512$

c)  $36/512$

3)  $4368/65536 = 6.67\%$

4)  $S = (1/4)/(1 - 1/4) = (1/4)/(3/4) = 1/3$

5)  $2/3$

## HW 9

1a) 25

b) 3

c) 65

d) 44

2a) 10001

b) 10101010

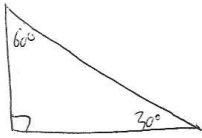
c) 11010100100

d) 100001001101000

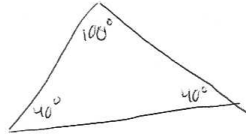
## HW 10

1)

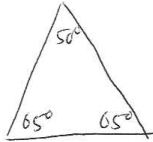
a)



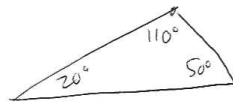
b)



c)



d)



2a)  $110^\circ$

b)  $73^\circ$

c)  $12^\circ$

3) 16.9 cm

4a) 29.9 ft

b) 49 mm

5a) 106.5 yd

b) 9.10 cm

6a) Long leg = 128 miles, Hyp = 148 miles

b) Short leg = 10.6 m, Hyp = 21.2 miles

c) Short leg = 42.34 in, ong leg = 73.36 in

7) 9200 square feet

8) 107 square feet

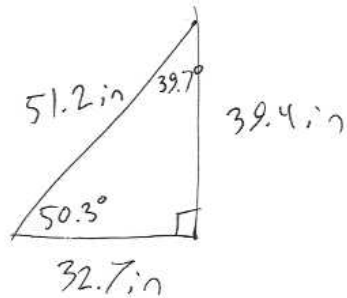
## HW 11

1)  $\sin(23^\circ) = 0.39$

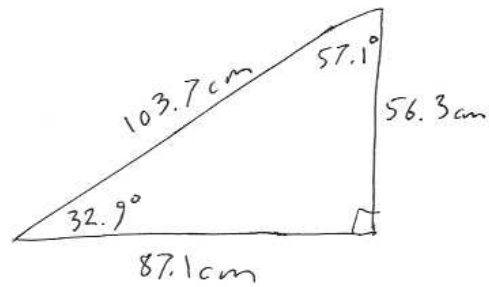
$\cos(23^\circ) = 0.92$

2)  $\tan(39^\circ) = 0.81$

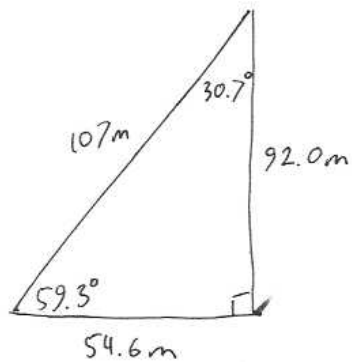
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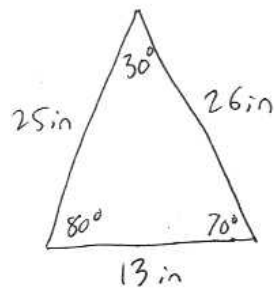
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5



6



## HW 12

1a)  $R(t) = 19.8(0.98659)^n$

b) 1.34%

c) 8.46 micrograms

d) 202 hours

2a)  $N(t) = 48(1.039)^n$

b) 325 followers

c) 79 days