Math 300 **Fall 2024**

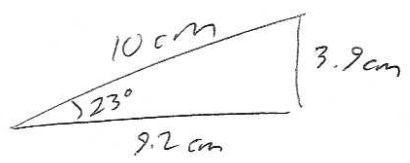
HW 12, Due Wednesday 12/18

1) The number of micrograms of a radioactive isotope decreases exponentially. At time 0 (3 PM today), there are 19.8 micrograms. Ten hours later (1 AM tomorrow), there are 17.3 micrograms.
a) Find an exponential model.
b) What percent decays per hour?
c) How much remains after 63 hours?
d) How many hours until 1.3 micrograms remain?

2) The number of your followers on ClipClop starts at 48, and increases by about 3.9% each day.
a) Find an exponential model.
b) How many followers do you have after 50 days?
c) How long until you have 1000 followers?

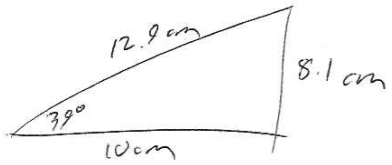
HW #11, Due Monday December 9

1) You draw this triangle.



Find sin(23°) and cos(23°) from the picture and measurements.

2) You draw this triangle.



Find tan(39°) from the picture and measurements.

3) A right triangle has legs 32.7 inches and 39.4 inches. Find the angles and third side. Draw a picture.

4) A right triangle has leg 87.1 cm and hypotenuse 103.7 cm. Find angles and third side. Draw a picture.

5) A right triangle has angle 59.3° and hypotenuse 107 m. Find the missing parts. Draw a picture.

6) A triangle has 30°, 70°, and 80° angles. The medium-sized side is 25 inches. Find the other sides. Draw a picture.

HW #10, Due Wednesday December 4

1) Draw a triangle with the given angles.
a) 90°, 30°, 60°
b) 100°, 40°, 40°
c) 65°, 65°, 50°
d) 110°, 55°, 25°

2) Find the third angles.
a) 50°, 20°
b) 90°, 17°
c) 120°, 48°

3) Triangles A and B are similar. Shortest side of A is 11.3 cm, medium side of A is 13.2 cm, medium side of B is 19.7 cm. Find shortest side of B.

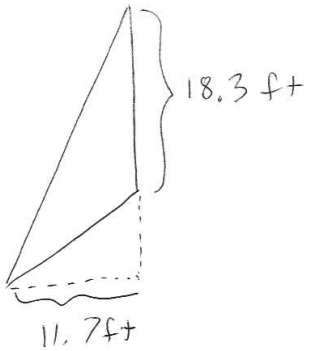
4a) Leg = 18.4 ft, Other Leg = 23.6 ft. Find hypotenuse.
4b) Leg = 113 mm, Hypotenuse = 123 mm. Find other leg.

5) Find the missing information for a 45-45-90 triangle
a) Leg = 75.3 yd
b) Hyp = 12.87 cm

6) Find the missing information for a 30-60-90 triangle
a) Short Leg = 74 miles
b) Long Leg = 18.4 m
c) Hypotenuse = 84.71 in

7) Find the area of this right triangle:
One Leg = 93 ft, Hypotenuse = 218 ft

8) Find the area of this triangle:



HW #9, Due Wednesday November 20

1) Convert from binary to base 10:
a) 11001
b) 11
c) 1000001
d) 101100

2) Convert from base 10 to binary:
a) 17
b) 170
c) 1700
d) 17000

HW #8 Due Monday November 18

Book, p. 445, #1–31 odd

HW #7 Due Monday November 4

Book, p. 329, #1–45 odd

HW #6 Due Monday October 21

Book, p. 313
#41, 45, 47, 67, 71, 79

And

1) Find the expansion of $(1 + x)^9$. Hint: Use Pascal's triangle instead of all that nasty algebra.

2) Find the probability of flipping 9 coins and getting exactly…
a) 5 heads
b) 6 heads
c) 7 heads

3) Find the probability of flipping 16 coins and getting exactly 11 heads.

4) Three people flip coins to try to win one prize. Each person's probability of winning should be $\frac{1}{3}$.

If all coin flips are the same, they flip again. If one person's coin is different than the other two, then that person wins the prize. The probability that you win is given by this series:

$$\frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \dots$$

Show that this equals $\frac{1}{3}$.

5) At the very end of a game of Old Maid, your probability of winning is given by this series:

$$\frac{1}{2} + \frac{1}{8} + \frac{1}{32} + \dots$$

Find the infinite sum.

HW #5 Due Monday October 14

Book, p. 310, #1−39 odd

HW #4 Due Monday October 7

1) The number of bacteria in a Petri dish gets multiplied by 7 each day. Assume this exponential model is valid for 10 days.
a) Find an exponential model for the number of bacteria in the dish after n days.
b) Find the number after 3 days.
c) Find the number after 9 days.
d) When will there be 100,000 bacteria?
e) When will there be 100,000,000 bacteria?

Also, problems from the book, p.194 #7, 9, 11, 15, 17

HW #3 Due September 23

1) At noon (time 0), there are 130 cars in the Costco parking lot. Cars enter and exit all afternoon, with (on average), the lot gaining 38 cars per hour. Assume this model is valid until 9PM.
a) Find a model for the number of cars in the lot n hours after noon.
b) How many cars are in the lot at 5PM?
c) How many cars are in the lot at 7:30 PM?
d) When will there be 200 cars in the lot?
e) When will there be 300 cars in the lot?

2) After your dog has surgery, her shaved tummy fur is 2.3 mm long. It grows 1.1 mm per week. Assume this model is valid for 32 weeks.
a) Find a model for the length of her tummy fur n weeks after the surgery.
b) How long will the fur be after 28 weeks?
c) How long will the fur be after 53 days? (Trick question.)
d) When will the fur be 8.0 mm?
e) When will the fur be 28.2 mm?

and from our book,
p. 193 (Growth Models), problems 1, 3, 5

3) On September 16, you have 378 followers on Instadog. On the 27th, you have 478 followers. Assume a linear growth model through the months of September and October.
a) Find a model for the number of followers on day n, where $n = 1$ is September 1.
b) How many followers did you have on September 1?
c) How many followers do you gain per day?
d) When did you have 300 followers?
e) When will you have 550 followers?

4) The population of East Virginia is 3.2 million in 2005 and 2.9 million in 2024. Assume a linear growth model for the years 2000 to 2030.
a) Find a model for the population n years after 2000.
b) Find the population in 2030.
c) What is the rate of change of population?
d) When will population be 3 million?

HW #2, Due September 16

1) Find all primes between 101 and 150. Make a grid of all of these numbers, and cross out all multiples of 2, 3, 5, 7, and 11.

2) Determine if each number is prime. If it is prime, show your reasoning. If it is not prime, find at least one proper factor (a factor not equal to 1 or the number in question.)

a) 6887
b) 6889
c) 6891
d) 6893
e) 6899

For each number,
a) Find the prime factorization.
b) Write all the factors.

3) 330

4) 2003

5) 1207

6) 999

7) 406

HW #1, Due September 9

1) Test each number for divisibility by 2, 3, 4, 5, 6, 8, 9, 10, 11, and 12.
No calculator. Explain your reasoning for each answer.
a) 2,224,530
b) 7,482,248
For problems 2 and 3, calculator is allowed, but show all your work.

2)
Fact: 703 * 7201 = 5,062,303
Fact: 703 * 4980 = 3,500,940
So, both 5,062,303 and 3,500,940 are divisible by 703.
So, that means the sum and difference of these 2 big numbers are also both divisible by 703.
Without using division, verify these 2 facts. Use the definition of divisibility, and some addition, subtraction, and multiplication only.

3a) Fact: 1957 * 898 = 1,757,386
So, that big number is divisible by both 1957 and 898.
So, that means that 19 times that big number is also divisible by both 1957 and 898. Without using division, verify these 2 facts. Use the definition of divisibility, and some addition, subtraction, and multiplication only.

4) Determine if each number is prime. If it is prime, show your reasoning. If it is not prime, find at least one proper factor (a factor not equal to 1 or the number in question.)

a) 511

b) 513

c) 515

d) 517

e) 521