

Math 16A
Vogler
Worksheet 3

1. Solve for θ , $0 \leq \theta < 2\pi$.
 - a. $\tan \theta = 1$
 - b. $\cot \theta = -\sqrt{3}$
 - c. $\tan 3\theta = 1/\sqrt{3}$
 - d. $\sin \theta \cos 2\theta = 0$
 - e. $4 \sin \theta \cos \theta = 1$
 - f. $\sin^2 \theta - 1/2 \sin \theta = 1/2$
2. Evaluate each of the following without using a calculator.
 - a. $\sin 22.5^\circ \cos 22.5^\circ$
 - b. $\sin^2 \pi/8$
 - c. $\cos^2 \pi/12$
 - d. $\sin 15^\circ$
 - e. $\cos 15^\circ$

A *parallelepiped* (See below.) is a three-dimensional figure formed by three sets of parallel faces. It is uniquely determined by any three edges E_1 , E_2 , and E_3 which share a common point and have lengths a , b , and c , resp. It can be shown that the volume of such a parallelepiped is given by

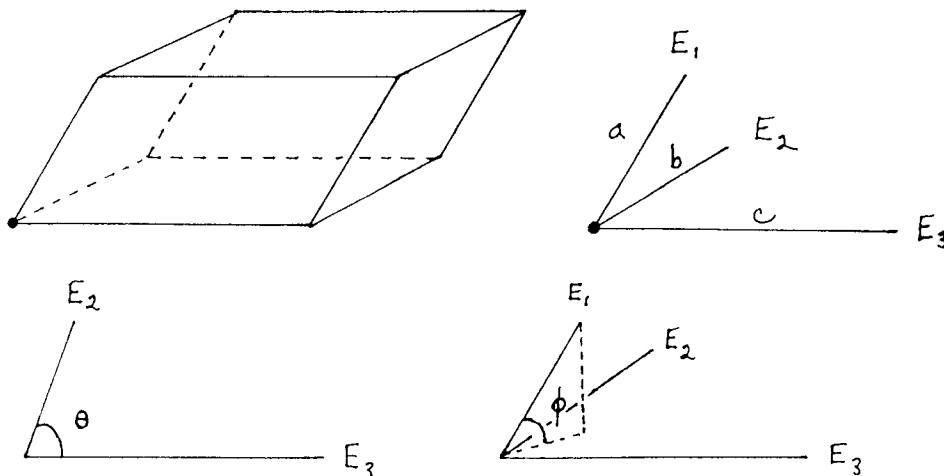
$$(*) \quad V = a b c \sin \theta \sin \phi,$$

where θ , $0 \leq \theta < \pi$, is the angle formed by edges E_2 and E_3 , and ϕ , $0 \leq \phi < \pi$, is the angle formed by E_1 and the flat plane containing E_2 and E_3 .

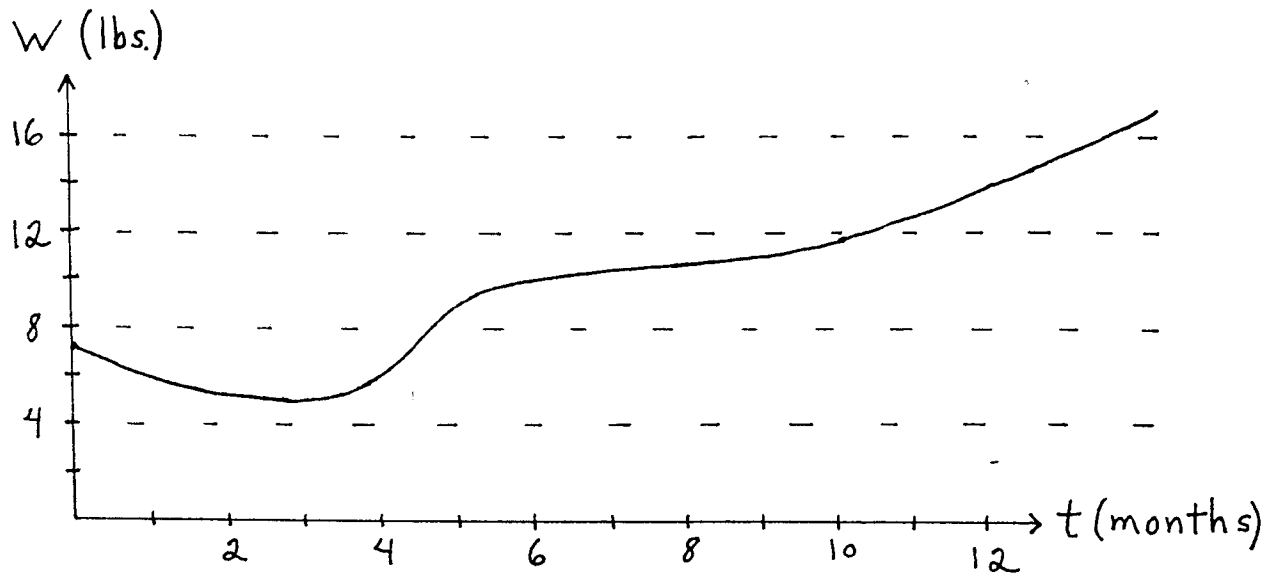
3. Find the volume of the parallelepiped with the following measurements.

- a. $a = 3$, $b = 4$, $c = 5$, $\theta = \pi/2$, $\phi = \pi/2$
- b. $a = 3$, $b = 4$, $c = 5$, $\theta = \pi/4$, $\phi = 5\pi/6$
- c. $a = 1.5$, $b = 2.6$, $c = 3.2$, $\theta = 3\pi/4$, $\phi = \pi/3$

4. Derive formula (*).



2. The following chart represents the weight W (lbs.) of a newborn baby as a function of time t (months).



- What is the baby's weight at birth ? after 3 months ? after 1 year ?
- What is an estimate of the baby's growth rate (lbs./month) at birth ? after 3 months ? after 1 year ?
- When is the baby growing at the fastest rate during its first year of life and what is an estimate for this rate ?