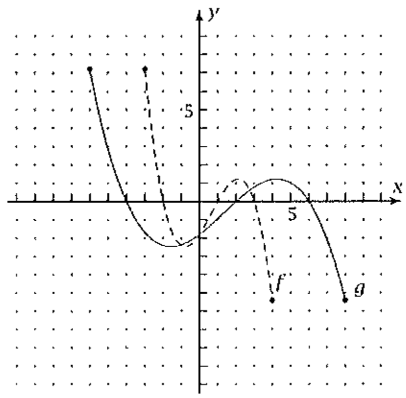
Are you ready for Calculus? Solve these Problems. Name ______________________________

You started the course by **transforming** parent functions by **dilation** and **translation.**

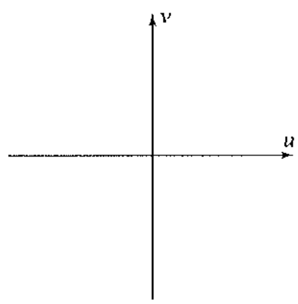
1. Describe verbally and algebraically what transformation was applied to the dashed graph, *f*, to get the solid graph, *g*.



Words:______________________

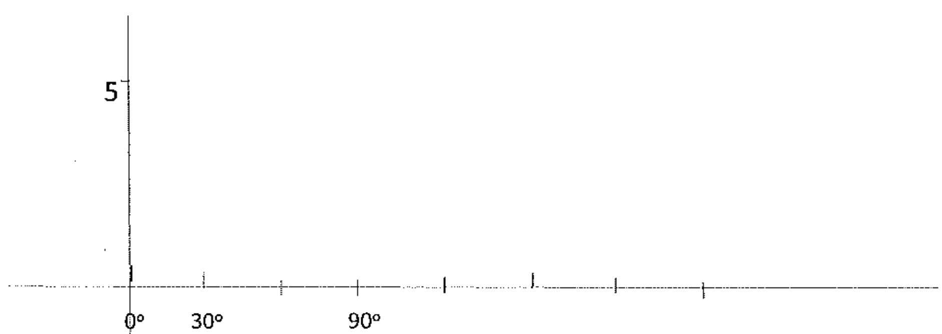
Equation: g(x) =

2. In precalculus you have used angles to measure **rotation,** so the angles can be greater than 180° or negative. Sketch an angle of 300° in **standard position** in a *uv*-coordinate system. Mark the **reference angle** and write its measure. Write the *exact* value (no decimals!) of cos 300°= __________.



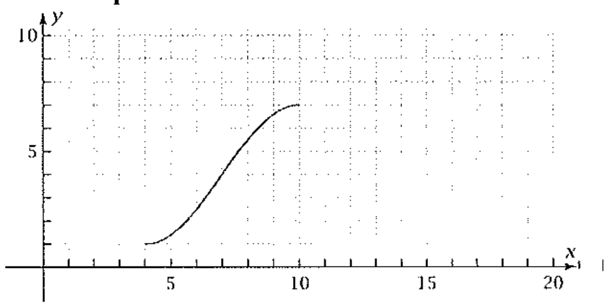
3. You apply transformations to a **sinusoid,** an example of a **periodic function.** Sketch one **cycle** of this sinusoid. Show coordinates of high and low points and **upper** and **lower bounds.**

$y = 2 + 3\cos 2(\theta - 30°)$



4.Use the appropriate property definition, or reference triangle to find $\cot x$ if
$\sin x = -0.6$ and $\cos x = 0.8$.

5. Making a **mathematical model** involves finding the particular equation. Complete at least one cycle of Cosine. **Find an equation** for **cos** of the sinusoid for which a half-cycle is shown here.



y =

6. Dilations and translations have special names when applied to sinusoids. For the graph in Problem 6, give the:
   - **Amplitude** =
   - **Period** =
   - **Phase displacement** (for cosine) D =
   - **Sinusoidal axis** location y =

You can find x or θ for a given value of y algebraically by finding values of **inverse circular** or **inverse trigonometric relations.**

7. Write the general solution for $x = \arcsin(-0.9)$.

8. Use the **composite argument property** for cosine to prove that $\cos(90° - \theta) = \sin \theta$.

Trigonometric functions are given that name because they are used in the measurement of triangles.

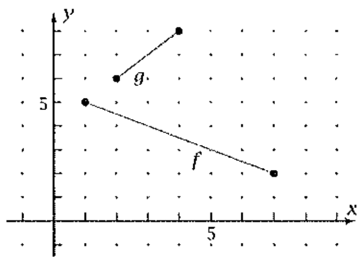
9. Recall that the **law of cosines**

Draw the triangle and use the law of cosines to find the third side of a triangle if two sides are 25 cm and 35 cm and the included angle is 145°.

Problems 10-11 involve the **composite function** $f(g(x))$, where

$f(x) = -0.5x + 5.5$ for $1 \le x \le 7$

$g(x) = 4 + x$ for $2 \le x \le 4$



10. **Algebraically** compose the two functions to an explicit equation for the composite: $y = f(g(x)) =$

11. Find the domain restrictions for the composition of $y = f(g(x))$ *if* ____ $\le x \le$ ____ Graph the result on the given figure.

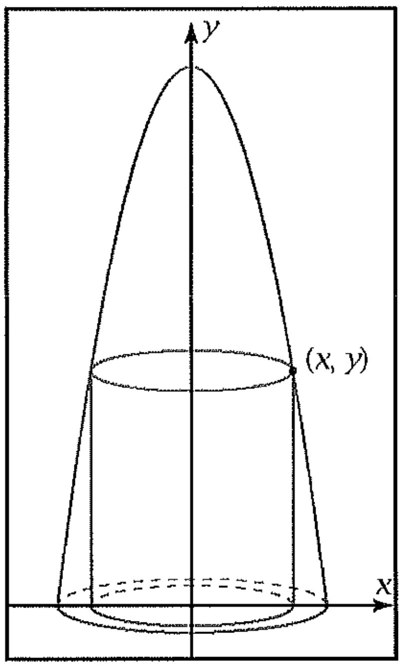
12. If you are given the table of functional values, use a system and algebra to find the **power function** that fits the data. Then use your function to find $f(12)$.

x	f(x)
2	22.5
3	10
5	3.6
10	.9
12	

13. Show the algebra to solve for x = then approximate x to the nearest thousandth. $x \approx$

$$\frac{3}{2} = \frac{3}{1+4e^{-0.2x}}$$

Inscribed Figure Problem (14-15): The figure shows a cylinder inscribed in a paraboloid. The paraboloid was formed by rotating about the y-axis the graph of
$y = 16 - x^2$.



14. Find the volume of the cylinder as a function of x and y at the sample point on the parabola. Then substitute for y to get the volume as a function of x alone. (The volume of a cylinder is the area of the base multiplied by the altitude.)

    $V = \pi r^2 h$

    V(x) =

15. Use your function of volume in your grapher to find the value of x, correct to three decimal places that gives the cylinder with the maximum volume. Sketch the volume function to the right. Then use the x to find the radius = ______units, height =__________units, and volume = _______un^3, for the cylinder with max volume.