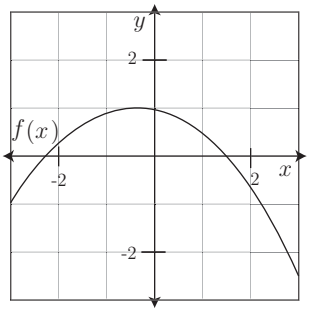
Chapter 8 Exam Name:_____

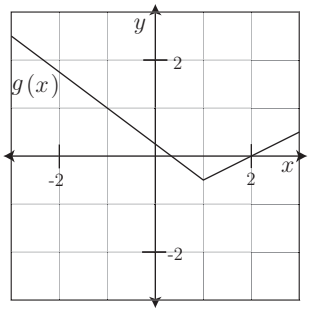
You may use a calculator to verify solutions, but not to provide them.

Show all relevant work!

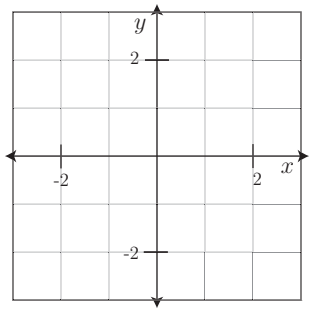
7pts 1. Use the functions, $f(x)$ and $g(x)$ graphed below to help you sketch $h(x) = f(g(x))$.



$f(x)$

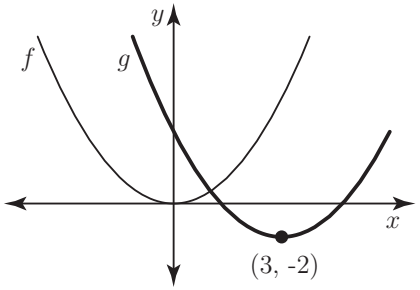


$g(x)$



$h(x)$

6pts 2. $g(x)$ is a translation of the parabola $f(x)$ as shown below. Write functions for vertical, $v(x)$, and horizontal, $h(x)$, translations and express $g(x)$ as a composition in terms of f, h, and v.



$h(x) =$_____

$v(x) =$_____

$g(x) =$_____

6pts 3. Express the function $w(x) = \frac{1}{\sqrt{1-x^2}}$ as the composition of two functions $u(x)$ and $v(x)$ where $w(x) = u(v(x))$. ($u(x) \neq x$ and $v(x) \neq x$)

$u(x) =$_____ $v(x) =$_____

8pts 4. Find a simplified formula for the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = \frac{1}{x}$.

3pts 5. If $k(x) = x^{x-1} - 3x$, find $k^{-1}(52)$.

6. The population of Broketown (in thousands) is given as a function of time, t, in years since 1990 by $P = f(t) = 4.5e^{-0.023t}$.

(a) Determine a formula for $f^{-1}(P)$ and explain what it represents including units.

4pts (b) What are the domain and range of $f^{-1}(P)$?

(c) Use your result to (a) to find $f^{-1}(2)$ and interpret its meaning. (include units).

4pts

4pts

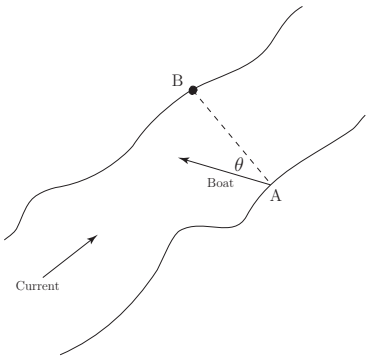
7. Use the tables below to help you determine $g(f^{-1}(6))$.

x	-6	-4	-2	0	2	4	6
$f(x)$	-1	5	6	7	3	-2	-11

x	-11	-7	-2	-1	5	7	8
$g(x)$	-8	-5	-3	-2	1	2	4

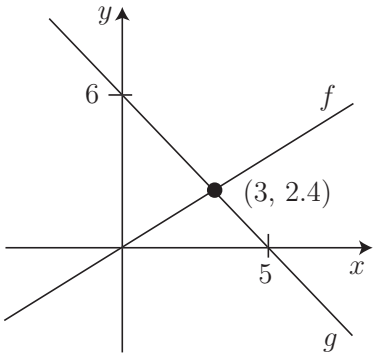
6pts

8. Captain Bly wants to pilot her boat directly across a river from point A to point B (see right). Her boat is capable of travelling 17 miles per hour in still water. If the current of the river is 4 miles per hour, at what angle (relative to the line directly across the river) should she travel?



10pts

9. The graphs of $f(x)$ and $g(x)$ are shown below. Find the equation of $h(x) = f(x) \cdot g(x)$ and sketch the graph on the same axes.



8pts

10. If $f(x)$ is an odd function and $g(x)$ is an even function, which of the functions, $u(x) = f(g(x))$ or $v(x) = g(f(x))$ (or both) is an even function? Prove your assertion.