

**This white-pages test has problems 1 – 11. Take a moment to make sure you have them all.**

**No Calculators Allowed; No Reference Materials; Just You and Your Pencil and Eraser.**

- 1 Quickly fill in the table with the exact values of the given clock-face angles:

| Hour    | $\theta$ rad | $\sin(\theta)$ | $\cos(\theta)$ | $\tan(\theta)$ |
|---------|--------------|----------------|----------------|----------------|
| 3 PM    |              |                |                |                |
| 2 PM    |              |                |                |                |
| 1:30 PM |              |                |                |                |
| 1 PM    |              |                |                |                |
| 12 noon |              |                |                |                |

- 2 Fill in the table with the exact values of the given clock-face angles:

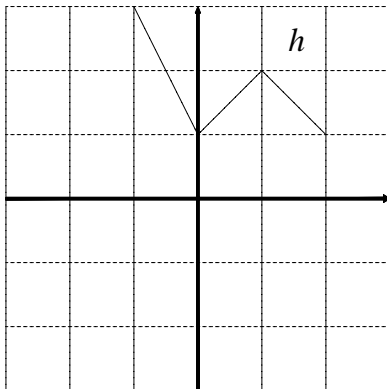
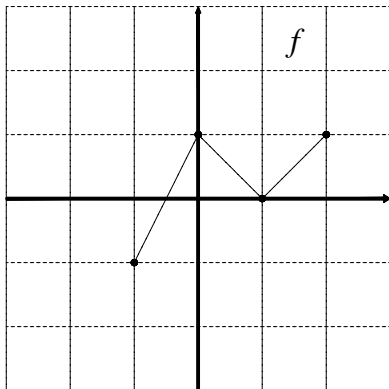
| Hour    | $\theta$ rad | $\sin(\theta)$ | $\cos(\theta)$ | $\tan(\theta)$ |
|---------|--------------|----------------|----------------|----------------|
| 7:30 PM |              |                |                |                |
| 4 PM    |              |                |                |                |

- 3 Let  $f(x) = \frac{3x}{12x + 5}$ . Compute and simplify  $f\left(\frac{x}{3}\right) - f\left(\frac{1}{x}\right)$ .

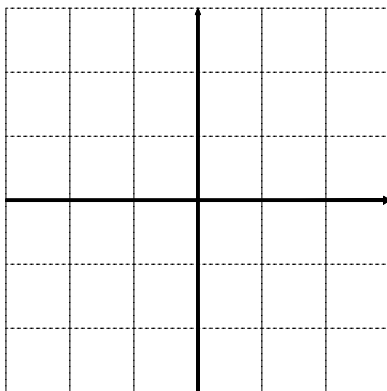
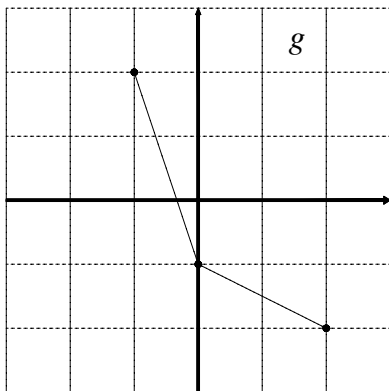
4 Make a rough graph of the equation  $(4x)^2 + \left(\frac{y}{3}\right)^2 = 25$ . Label salient features of your graph with their exact coordinates.

5 Make a rough graph of the equation  $y = 2x^3 + 3x^2 - 8x - 12$ . Label salient features of your graph with their exact coordinates.

6 Consider the graphs of  $f$  and  $h$ . In the space at the right, give formula for  $h(x)$  in terms of  $f$ .



7 Consider the graph of  $g$  shown. Give a graph of the function  $g^{-1}$  in the empty graph window.

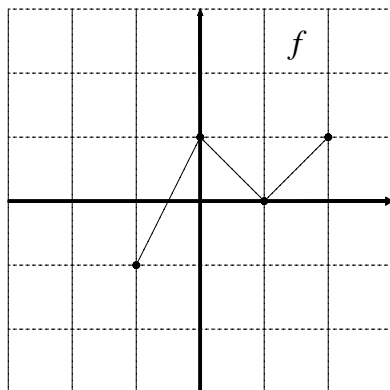


8 For each of the following, give the numeric value of the given expression ( $f$  and  $g$  are as in problems 6 and 7). Some approximations may be necessary. Some expressions may be undefined.

(a)  $g \circ f(1) =$  \_\_\_\_\_ (c)  $f^{-1}(g(1)) =$  \_\_\_\_\_ (e)  $f(f(2)) =$  \_\_\_\_\_

(b)  $f \circ g(2) =$  \_\_\_\_\_ (d)  $g(g(0)) =$  \_\_\_\_\_ (f)  $g^{-1}(g(1)) =$  \_\_\_\_\_

9 Here is the graph of  $f$  (from problem 6) again:



Use interval notation where appropriate:

(a) For  $f$  the domain is \_\_\_\_\_ and the range is \_\_\_\_\_.

(b) For  $y = f(x/3)$ , the domain is \_\_\_\_\_ and the range is \_\_\_\_\_.

10 Make a rough graph of  $g(x) = -4x^2 - 24x - 16$ . Label salient features of the graph with their exact coordinates (intercepts, vertices, asymptotes).

- 11 Let  $f$  be given by  $f(x) = \frac{x^2 - 3x + 2}{x^2 - x - 12}$ . Make a rough graph of  $f$  showing intercepts, asymptotes and end behavior.