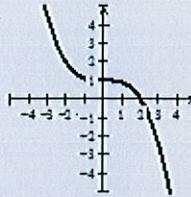[ ]   Let f be the function whose graph is shown here.
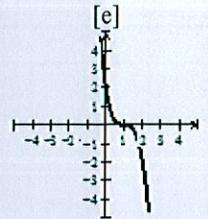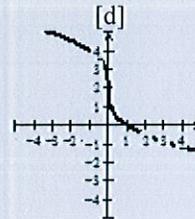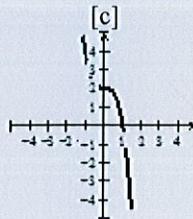
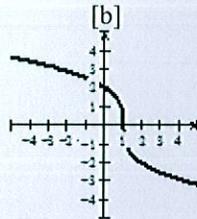Which of the graphs below is f^{-1} ?   **ANSWER:**   ⑦ B

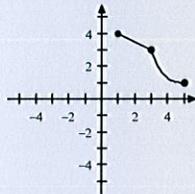[a]   [b]   [c]   [d]   [e]
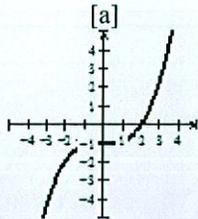
[ ]   You are trying to sketch the graph of an equation. You draw **part** of the graph as shown below.
Replacing x with $-x$ does not yield an equivalent equation.
Replacing y with $-y$ yields an equivalent equation.
Replacing x with $-x$ and y with $-y$ does not yield an equivalent equation.

Partially drawn graph

Sketch the entire graph of the equation on the axes on the right.   **ANSWER:**

③ ④
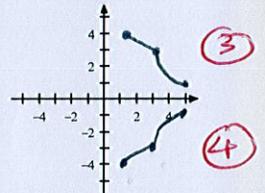
[ ]   Sketch the following graphs.

③   ④   ④   ③

$f(x) = x^3$ $f(x) = \frac{1}{x-3}$ $f(x) = [[-x]]$ $f(x) = |x| - 3$
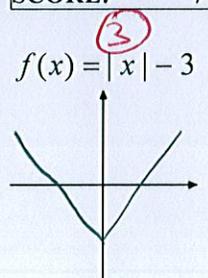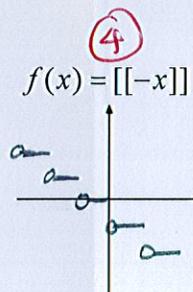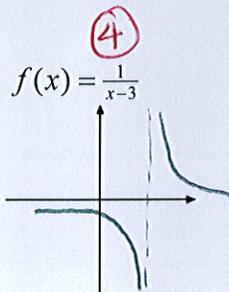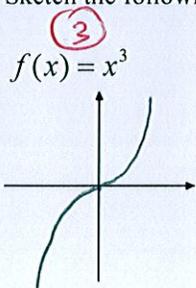
[ ]   Let f be the function whose graph (a half-parabola) is shown below.
Find the equation for f using transformations.
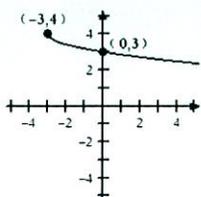
ANSWER: $-\sqrt{\frac{1}{3}(x+3)} + 4$

PARENT FUNCTION $f(x) = \sqrt{x}$
VERTICAL REFLECTION
SHIFT UP 4
HORIZONTAL STRETCH (FACTOR 3)
SHIFT LEFT 3
$-f(\frac{1}{3}(x+3) + 4)$

② ③ ② ②   ②
③ CORRECT
ORDER
INSIDE $\sqrt{}$

[ ] According to the Old Farmer's Almanac, you can find the outdoor temperature by first counting the number of cricket chirps per minute. The function $T(c) = \frac{4}{5}c + 4$ then gives the temperature in degrees Celsius, where c is the number of cricket chirps per minute.

6 [a] Find the $c-$ and $T-$ intercepts of the function.

$T\text{-INT}: T(0) = \frac{4}{5}(0) + 4 = 4$

$C\text{-INT}: 0 = \frac{4}{5}c + 4$

$\frac{4}{5}c = -4 \longrightarrow c = -5$

ANSWER: $c-$int -5 ③

$T-$int 4 ③

4 [b] Interpret the meaning of the $T-$intercept in context.
Do not use any of the following variables in your anwer: c, T, x, y
Do not use any of the following words in your answer:
   intercept, axis, vertical, horizontal, input, output, graph, function, variable, slope, rise, run

ANSWER: ④ AT 4°C, THE CRICKETS WILL STOP CHIRPING

4 [c] Interpret the meaning of the slope in context.
Do not use any of the following variables in your answer: c, T, x, y
Do not use any of the following words in your answer:
   intercept, axis, vertical, horizontal, input, output, graph, function, variable, slope, rise, run

ANSWER: ④ EACH ADDITIONAL CHIRP PER MINUTE CORRESPONDS TO A $\frac{4}{5}$°C INCREASE IN TEMPERATURE

[ ]   Let $f(x) = 2\sqrt{-x+1} - 5$.

4 [a]   List the sequence of transformations **in correct order** from the parent function to f.

① VERTICAL

TRANSFORMATION #1: **STRETCH (FACTOR 2)**   ④ TRANSFORMATION #4: **REFLECT OVER y-AXIS**

(leave blank if < 4 transformations)

#1 BEFORE #2

②

TRANSFORMATION #2: **SHIFT DOWN 5**   TRANSFORMATION #5: _____

(leave blank if < 2 transformations)   (leave blank if < 5 transformations)

#3 BEFORE #4

③

TRANSFORMATION #3: **SHIFT LEFT 1**   TRANSFORMATION #6: _____

(leave blank if < 3 transformations)   (leave blank if < 6 transformations)

7 [b]   Sketch the graph of f using transformations. **Label appropriate scales on the x – and y – axes.**

Show the step-by-step transformation of 2 points on the parent function as shown in lecture.

$(0,0) \longrightarrow (0,0) \longrightarrow (0,-5) \longrightarrow (-1,-5) \longrightarrow (1,-5)$ ②

$(1,1) \longrightarrow (1,2) \longrightarrow (1,-3) \longrightarrow (0,-3) \longrightarrow (0,-3)$ **ANSWER:**

②

③
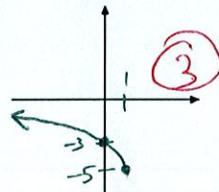
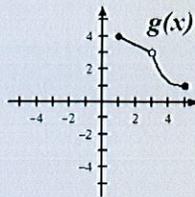**10 [c]**   Find $f^{-1}(x)$.   **ANSWER:** $f^{-1}(x) = 1 - \left(\frac{x+5}{2}\right)^2$

②

$y = 2\sqrt{-x+1} - 5$

$x = 2\sqrt{-y+1} - 5$ ②

$x + 5 = 2\sqrt{-y+1}$ ②

$\dfrac{x+5}{2} = \sqrt{-y+1}$ ②

$\left(\dfrac{x+5}{2}\right)^2 = -y+1$ ②

$y = 1 - \left(\dfrac{x+5}{2}\right)^2 = \dfrac{4 - (x^2 + 10x + 25)}{4} = \dfrac{-x^2 - 10x - 21}{4}$

[ ] Let $f(x) = \dfrac{5x+11}{7-3x}$.

Let g be the function whose graph is shown on the right.

$g(x)$

Let h be the function given by the table of values below.

$x =$	0	1	2	3	4	5
$h(x) =$	3	2	5	4	1	0

4 [a] Find $[[f(4)]]$.

$\left[\dfrac{31}{-5}\right] = [-6.2] = -7$ ②

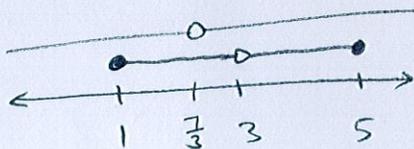ANSWER: -7 ②

4 [b] Find the domain of f.

$7 - 3x \neq 0$

$-3x \neq -7$

$x \neq \dfrac{7}{3}$ ②

ANSWER: $\left(-\infty, \dfrac{7}{3}\right) \cup \left(\dfrac{7}{3}, \infty\right)$ ②

4 [c] Find the domain of g.

ANSWER: $[1,3) \cup (3,5]$ ②

4 [d] Find the domain of $f - g$.

ANSWER: $[1, \dfrac{7}{3}) \cup (\dfrac{7}{3}, 3) \cup (3,5]$ ④

3 [e] Find $g^{-1}(1)$.

$g^{-1}(1) = x$

$g(x) = 1$ ①

$x = 5$

ANSWER: 5 ②

4 [f] Find the range of g.

ANSWER: $[1,3) \cup (3,4]$ ②

4 [g] Find the range of g^{-1}.

DOMAIN OF g = RANGE OF g^{-1} ②

ANSWER: $[1,3) \cup (3,5]$ ②

THIS QUESTION CONTINUED ON NEXT PAGE

3 [h] Find the zero(s) of h.

$$h(x) = 0$$
$$x = 5$$

ANSWER: $\underline{5}$ ③

4 [i] Find $\left(\dfrac{g}{f}\right)(5)$.

$$\frac{g(5)}{f(5)} = \frac{\boxed{1} \ ①}{\boxed{\frac{36}{-8}} \ ①} = -\frac{8}{36} = -\frac{2}{9}$$

ANSWER: $\boxed{-\dfrac{2}{9}}$ ②

4 [j] Find $(gh)(1)$.

$$g(1)\,h(1) = \underset{①}{4}\,\underset{①}{(2)} = 8$$

ANSWER: $\underline{8}$ ②

4 [k] Find $(f \circ h^{-1})(3)$.

$$f(h^{-1}(3)) = f(\underset{②}{0}) = \frac{11}{7}$$

ANSWER: $\dfrac{11}{7}$ ②

4 [l] Find $(g \circ g^{-1})(5)$.

5 IS NOT IN DOMAIN OF g^{-1}
RANGE OF g

ANSWER: UNDEFINED ④

7 [m] Find the average rate of change of h from $x_1 = 1$ to $x_2 = 5$.

$$\frac{h(5) - h(1)}{5 - 1} = \frac{0 - 2}{5 - 1} = \frac{-2}{4} = -\frac{1}{2}$$ ④

ANSWER: $\boxed{-\dfrac{1}{2}}$ ③

10 [n] Find the difference quotient $\dfrac{f(x) - f(1)}{x - 1}$.

$$\frac{\boxed{\dfrac{5x+11}{7-3x}} - 4}{x - 1} = \frac{5x+11 - 4(7-3x)}{(x-1)(7-3x)} = \frac{5x+11 - 28 + 12x}{(x-1)(7-3x)}$$

$$= \frac{17x - 17}{(x-1)(7-3x)} = \frac{17(x-1)}{(x-1)(7-3x)} = \frac{17}{7-3x}$$

ANSWER: $\boxed{\dfrac{17}{7-3x}}$ ②