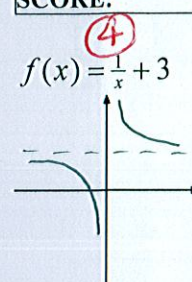
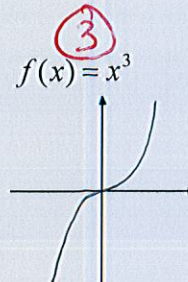
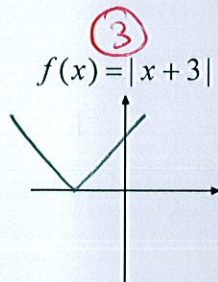
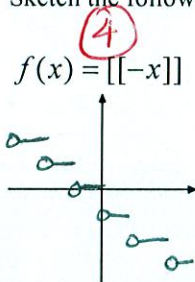


[] Sketch the following graphs.

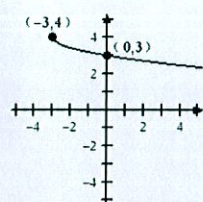
SCORE: / 14 PTS



[] Let f be the function whose graph (a half-parabola) is shown below.

SCORE: / 14 PTS

Find the equation for f using transformations.



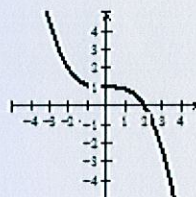
PARENT FUNCTION $f(x) = \sqrt{x}$
 VERTICAL REFLECTION
 SHIFT UP 4
 HORIZONTAL STRETCH (FACTOR 3)
 SHIFT LEFT 3
 $-f(\frac{1}{3}(x+3)) + 4$

ANSWER:

$-\sqrt{\frac{1}{3}(x+3)} + 4$
 ↑ ↑ ↑ ↑ ↑
 ② ③ ② ② ②
 ③ CORRECT ORDER INSIDE ✓

[] Let f be the function whose graph is shown here.

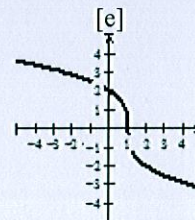
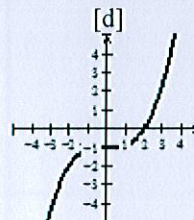
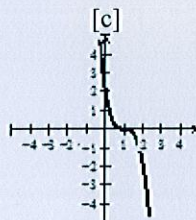
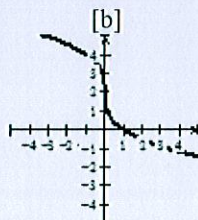
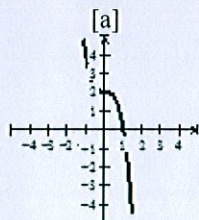
SCORE: / 7 PTS



Which of the graphs below is f^{-1} ?

ANSWER:

⑦
E



[] You are trying to sketch the graph of an equation. You draw part of the graph as shown below.

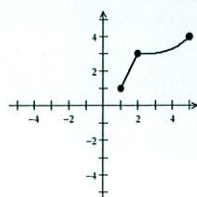
SCORE: / 7 PTS

Replacing x with $-x$ does not yield an equivalent equation.

Replacing y with $-y$ yields an equivalent equation.

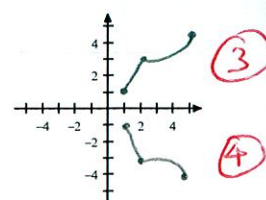
Replacing x with $-x$ and y with $-y$ does not yield an equivalent equation.

Partially drawn graph



Sketch the entire graph of the equation on the axes on the right.

ANSWER:



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

SCORE: / 21 PTS

- 4 [a] List the sequence of transformations in correct order from the parent function to f . ^① HORIZONTAL

TRANSFORMATION #1: ^① REFLECT OVER X-AXIS TRANSFORMATION #4: ^① COMPRESS (FACTOR $\frac{1}{2}$)
(leave blank if < 4 transformations)

#1 BEFORE #2

TRANSFORMATION #2: ^① SHIFT UP 1 TRANSFORMATION #5: _____
(leave blank if < 2 transformations) (leave blank if < 5 transformations)

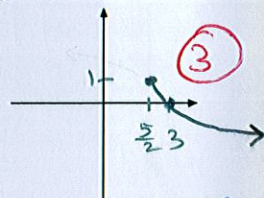
TRANSFORMATION #3: ^① SHIFT RIGHT 5 TRANSFORMATION #6: _____
(leave blank if < 3 transformations) (leave blank if < 6 transformations)

#3 BEFORE #4

- 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.

$(0,0) \rightarrow (0,0) \rightarrow (0,1) \rightarrow (5,1) \rightarrow (\frac{5}{2}, 1)$ ^②
 $(1,1) \rightarrow (1,-1) \rightarrow (1,0) \rightarrow (6,0) \rightarrow (3,0)$ ^② ANSWER:



- 10 [c] Find $f^{-1}(x)$.

$y = -\sqrt{2x-5} + 1$
 $x = -\sqrt{2y-5} + 1$ ^②
 $\sqrt{2y-5} = 1-x$ ^②
 $2y-5 = (1-x)^2$ ^②
 $2y = (1-x)^2 + 5$ ^②
 $y = \frac{(1-x)^2 + 5}{2} = \frac{1-2x+x^2+5}{2} = \frac{1}{2}x^2 - x + 3$ ^②

ANSWER:

$f^{-1}(x) = \frac{(1-x)^2 + 5}{2}$

- [] 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. SCORE: / 14 PTS

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

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

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

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

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 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) 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:

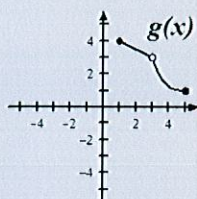
intercept, axis, vertical, horizontal, input, output, graph, function, variable, slope, rise, run

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

[] Let $f(x) = \frac{7x+11}{5-2x}$.

SCORE: / 63 PTS

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



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

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

4 [a] Find $[[f(5)]]$.

$$\left[\frac{46}{-5}\right] = \left[-9\frac{1}{5}\right] = -10$$

ANSWER:

$$\underline{-10}$$

4 [b] Find the domain of g .

ANSWER:

$$\underline{[1, 3) \cup (3, 5]}$$

4 [c] Find the domain of f .

ANSWER:

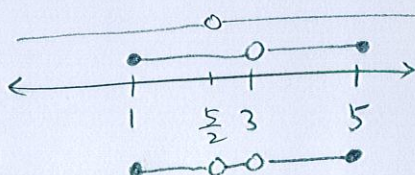
$$\underline{\left(-\infty, \frac{5}{2}\right) \cup \left(\frac{5}{2}, \infty\right)}$$

$$\begin{aligned} 5-2x &\neq 0 \\ -2x &\neq -5 \\ x &\neq \frac{5}{2} \end{aligned}$$

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

ANSWER:

$$\underline{\left[1, \frac{5}{2}\right) \cup \left(\frac{5}{2}, 3\right) \cup (3, 5]}$$



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

ANSWER:

$$\underline{3}$$

$$\begin{aligned} h(x) &= 0 \\ x &= 3 \end{aligned}$$

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

ANSWER:

$$\underline{[1, 3) \cup (3, 5]}$$

$$= \text{DOMAIN OF } g$$

4 [g] Find the range of g .

ANSWER:

$$\underline{[1, 3) \cup (3, 4]}$$

THESE QUESTIONS CONTINUED FROM PREVIOUS PAGE

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

$$\begin{array}{l} g^{-1}(1) = x \\ g(x) = 1 \\ \hline x = 5 \end{array} \quad \textcircled{1}$$

ANSWER:

$$\frac{5}{\textcircled{2}}$$

4 [i] Find $(gf)(1)$.

$$g(1)f(1) = (4)\left(\frac{18}{3}\right) = 4(6) = 24$$

$\begin{array}{cc} \textcircled{1} & \textcircled{1} \end{array}$

ANSWER:

$$\frac{24}{\textcircled{2}}$$

4 [j] Find $\left(\frac{h}{f}\right)(4)$.

$$\frac{h(4)}{f(4)} = \frac{3}{\frac{39}{-3}} = \frac{3}{-13}$$

ANSWER:

$$\frac{-\frac{3}{13}}{\textcircled{4}}$$

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

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

ANSWER:

$$\frac{\text{UNDEFINED}}{\textcircled{4}}$$

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

$$f(h^{-1}(3)) = f(4) = -13$$

$\textcircled{2}$

ANSWER:

$$\frac{-13}{\textcircled{2}}$$

7 [m] Find the average rate of change of h from $x_1 = 1$ to $x_2 = 3$.

$$\frac{h(3) - h(1)}{3 - 1} = \frac{0 - 4}{3 - 1} = \frac{-4}{2} = -2$$

$\textcircled{4}$

ANSWER:

$$\frac{-2}{\textcircled{3}}$$

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

$$\begin{aligned} \frac{\frac{7x+11}{5-2x} - 6}{x-1} &= \frac{7x+11-6(5-2x)}{(x-1)(5-2x)} = \frac{7x+11-30+12x}{(x-1)(5-2x)} \\ &= \frac{19x-19}{(x-1)(5-2x)} = \frac{19(x-1)}{(x-1)(5-2x)} = \frac{19}{5-2x} \end{aligned}$$

$\textcircled{2}$

ANSWER:

$$\frac{19}{5-2x} \quad \textcircled{2}$$