Student: _____	**Instructor:** Keith Barrs	**Assignment:** Practice Problems for Test 3 (NEW SP12)
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1. Determine whether the function is a polynomial function. If it is, state the degree. If it is not, tell why not.

$g(x) = x^{4/3} - x^2 - 9$

Choose the correct answer below.

- ○ Not a polynomial because there is no x term
- ○ Polynomial of degree 2
- ○ Not a polynomial because $\frac{4}{3}$ is not an integer
- ○ Polynomial of degree $\frac{4}{3}$

2. Determine whether the function is a polynomial function. If it is, state the degree. If it is not, tell why not.

$F(x) = 2x^4 - \pi x^3 + \frac{4}{5}$

Choose the correct answer below.

- ○ A. Polynomial of degree 4
- ○ B. Polynomial of degree 2
- ○ C. Not a polynomial because π is not an integer.
- ○ D. Not a polynomial because of the negative power of x

3. Form a polynomial whose real zeros and degree are given. Type your answer in factored form using a leading coefficient of 1.

Zeros: $-3, -1, 3, 5$; degree: 4

$f(x) =$ ☐

(Type your answer in factored form.)

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4. Form a polynomial whose zeros and degree are given.

Zeros: -1, multiplicity 1; -2, multiplicity 2; degree 3

Type a polynomial with integer coefficients and a leading coefficient of 1 in the box below.

$f(x) =$ ☐

5. Find the domain of the following rational function.

$$H(x) = \frac{-2x^2}{(x-4)(x+7)}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ A. The domain of H(x) is $\{x|x \neq$ ☐ $\}$. (Use a comma to separate answers as needed.)
- ○ B. The domain of H(x) has no restrictions.

6. Find the domain of the following rational function.

$$F(x) = \frac{6x(x-2)}{2x^2-9x-5}$$

Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. The domain of F(x) is $\{x \mid x \neq$ ☐ $\}$.
  (Use a comma to separate answers as needed.)
- ○ B. There are no restrictions on the domain of F(x).

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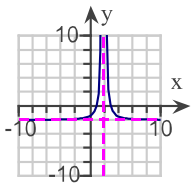
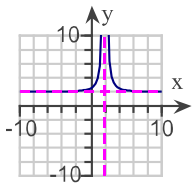
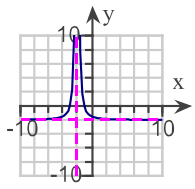
7. Graph the following rational function using transformations.

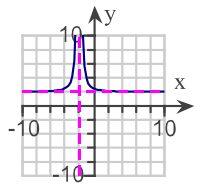
$$G(x) = 2 + \frac{2}{(x-2)^2}$$

Select the correct graph.

○ A. 

○ B. 

○ C. 

○ D. 

8. Find the vertical, horizontal, and oblique asymptotes, if any, for the following rational function.

$$R(x) = \frac{14x}{x+8}$$

Select the correct choice below and fill in any answer boxes within your choice.

○ A. The vertical asymptote(s) is/are x = ☐.
(Use a comma to separate answers as needed.)

○ B. There is no vertical asymptote.

Select the correct choice below and fill in any answer boxes within your choice.

○ A. The horizontal asymptote(s) is/are y = ☐.
(Use a comma to separate answers as needed.)

○ B. There is no horizontal asymptote.

Select the correct choice below and fill in any answer boxes within your choice.

○ A. The oblique asymptote(s) is/are y = ☐.
(Use a comma to separate answers as needed.)

○ B. There is no oblique asymptote.

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9. Find the vertical, horizontal, and oblique asymptotes, if any, for the following rational function.

$$Q(x) = \frac{1 - x^2}{9x^4}$$

Find the vertical asymptotes, if any. Select the correct choice below and fill in any answer boxes within your choice.

A. $x =$ ☐
(Use a comma to separate answers as needed.)

B. There is no vertical asymptote.

Find the horizontal asymptotes, if any. Select the correct choice below and fill in any answer boxes within your choice.

A. $y =$ ☐

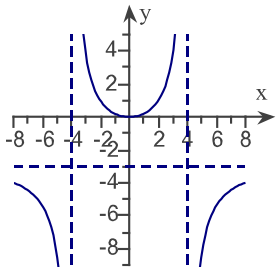
B. There is no horizontal asymptote.

Find the oblique asymptotes, if any. Select the correct choice below and fill in any answer boxes within your choice.

A. $y =$ ☐

B. There is no oblique asymptote.

10. Which rational function has the given graph?



A. $R(x) = \frac{3x^2}{x^2 - 16}$

B. $R(x) = -\frac{3x^2}{x^2 - 16}$

C. $R(x) = -\frac{3x^2}{x^2 + 16}$

D. $R(x) = \frac{3x^2}{x^2 + 16}$

11. Given $f(x) = 3x$ and $g(x) = 4x^2 + 2$, find

(a) $(f \circ g)(4)$ (b) $(g \circ f)(2)$ (c) $(f \circ f)(1)$ (d) $(g \circ g)(0)$

(a) What is $(f \circ g)(4)$?

$(f \circ g)(4) =$ ☐

(b) What is $(g \circ f)(2)$?

$(g \circ f)(2) =$ ☐

(c) What is $(f \circ f)(1)$?

$(f \circ f)(1) =$ ☐

(d) What is $(g \circ g)(0)$?

$(g \circ g)(0) =$ ☐

12. Given $f(x) = 2x^2 - 1$ and $g(x) = 4 - \frac{1}{2}x^2$, find the following expressions.

(a) $(f \circ g)(4)$ (b) $(g \circ f)(2)$ (c) $(f \circ f)(1)$ (d) $(g \circ g)(0)$

(a) $(f \circ g)(4) =$ ☐ (Simplify your answer.)

(b) $(g \circ f)(2) =$ ☐ (Simplify your answer.)

(c) $(f \circ f)(1) =$ ☐ (Simplify your answer.)

(d) $(g \circ g)(0) =$ ☐ (Simplify your answer.)

13. Given $f(x) = 3\sqrt{x}$ and $g(x) = 2x$, find the following expressions.

(a) $(f \circ g)(4)$ (b) $(g \circ f)(2)$ (c) $(f \circ f)(1)$ (d) $(g \circ g)(0)$

(a) $(f \circ g)(4) =$ ☐
(Type an exact answer, using radicals as needed. Simplify your answer.)

(b) $(g \circ f)(2) =$ ☐
(Type an exact answer, using radicals as needed. Simplify your answer.)

(c) $(f \circ f)(1) =$ ☐
(Type an exact answer, using radicals as needed. Simplify your answer.)

(d) $(g \circ g)(0) =$ ☐
(Type an exact answer, using radicals as needed. Simplify your answer.)

14. For $f(x) = 11x$ and $g(x) = \frac{1}{11}x$, find $(f \circ g)(x)$ and $(g \circ f)(x)$. Then determine whether $(f \circ g)(x) = (g \circ f)(x)$.

What is $(f \circ g)(x)$?

$(f \circ g)(x) =$ ☐

What is $(g \circ f)(x)$?

$(g \circ f)(x) =$ ☐

Does $(f \circ g)(x) = (g \circ f)(x)$?

- ○ Yes
- ○ No

15. For $f(x) = 6x - 5$ and $g(x) = \frac{1}{6}(x + 5)$, find $(f \circ g)(x)$ and $(g \circ f)(x)$. Then determine whether $(f \circ g)(x) = (g \circ f)(x)$.

What is $(f \circ g)(x)$?

$(f \circ g)(x) =$ ☐

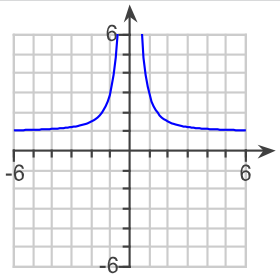
What is $(g \circ f)(x)$?

$(g \circ f)(x) =$ ☐

Does $(f \circ g)(x) = (g \circ f)(x)$?

- ○ Yes
- ○ No

16. The graph of a function f is given. Use the horizontal-line test to determine whether f is one-to-one.



Is f one-to-one? Choose the correct answer below.

- ○ No
- ○ Yes

17. Find the inverse of the one-to-one function. State the domain and range of the inverse function.

$\{(-5,0), (-10,3), (7,-3), (0,-15), (3,-14)\}$

Which of the following is the inverse function?

- ○ $\{(3,-14), (0,-15), (7,-3), (-10,3), (-5,0)\}$
- ○ $\{(0,3), (3,0), (-3,7), (-15,-10), (-14,-5)\}$
- ○ $\{(0,-5), (3,-10), (-3,7), (-15,0), (-14,3)\}$
- ○ $\{(5,0), (10,-3), (-7,3), (0,15), (-3,14)\}$

What is the domain of the inverse function?

- ○ $\{0, 3, -3, -15, -14\}$
- ○ $\{-14\}$
- ○ $\{-5, -10, 7, 0, 3\}$
- ○ $\{-5\}$

What is the range of the inverse function?

- ○ $\{-5, -10, 7, 0, 3\}$
- ○ $\{-5\}$
- ○ $\{0, 3, -3, -15, -14\}$
- ○ $\{-14\}$

18. Consider the functions $f(x) = x^3 - 2$ and $g(x) = \sqrt[3]{x+2}$.
(a) Find f(g(x)).
(b) Find g(f(x)).
(c) Determine whether the functions f and g are inverses of each other.

(a) What is f(g(x))?

$f(g(x)) =$ ☐ (Simplify your answer.)

Give any values of x that need to be excluded from f(g(x)). Select the correct choice below and fill in any answer boxes within your choice.

○ A. $x \neq$ ☐
(Use a comma to separate answers as needed.)

○ B. No values should be excluded from the domain.

(b) What is g(f(x))?

$g(f(x)) =$ ☐ (Simplify your answer.)

Give any values of x that need to be excluded from g(f(x)). Select the correct choice below and fill in any answer boxes within your choice.

○ A. $x \neq$ ☐
(Use a comma to separate answers as needed.)

○ B. No values should be excluded from the domain.

(c) Are the functions f and g inverses of each other? Choose the correct answer below.

○ Yes

○ No

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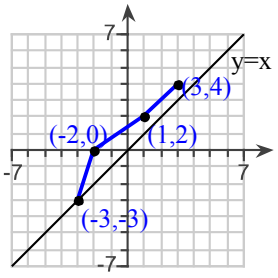
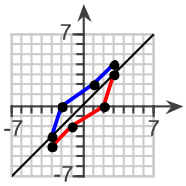
19. The graph of a one-to-one function f is given. Draw the graph of the inverse function f^{-1}. For convenience (and as a hint), the graph of y = x is also given.

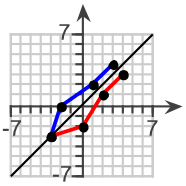


Choose the correct graph of the inverse function f^{-1} below.

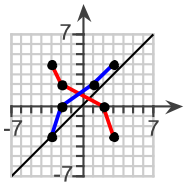
○ A.



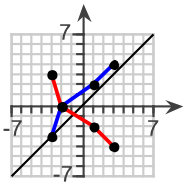
○ B.



○ C.



○ D.



20. The function $f(x) = 2x$ is one-to-one.
(a) Find the inverse of f.
(b) State the domain and range of f.
(c) State the domain and range of f^{-1}.
(d) Graph f, f^{-1}, and $y = x$ on the same set of axes.

(a) What is the inverse of f?

$f^{-1}(x) =$ ☐
(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(b) State the domain and range of f. Select the correct choice below and fill in any answer boxes within your choice.

- ◯ A. The domain of f is {x| ☐ }.
  (Type an inequality or a compound inequality. Use integers or fractions for any numbers in the expression.)
- ◯ B. The answer is all real numbers.

Select the correct choice below and fill in any answer boxes within your choice.

- ◯ A. The range of f is {y| ☐ }.
  (Type an inequality or a compound inequality. Use integers or fractions for any numbers in the expression.)
- ◯ B. The answer is all real numbers.

(c) State the domain and range of f^{-1}. Select the correct choice below and fill in any answer boxes within your choice.

- ◯ A. The domain of f^{-1} is {x| ☐ }.
  (Type an inequality or a compound inequality. Use integers or fractions for any numbers in the expression.)
- ◯ B. The answer is all real numbers.

Select the correct choice below and fill in any answer boxes within your choice.

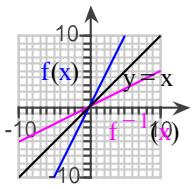
20. (cont.)

○ A. The range of f^{-1} is $\{y|\square\}$.
(Type an inequality or a compound inequality. Use integers or fractions for any numbers in the expression.)

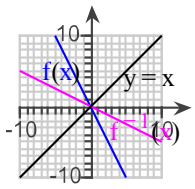
○ B. The answer is all real numbers.

(d) Graph f, f^{-1}, and y = x on the same set of axes. Choose the correct graph below.

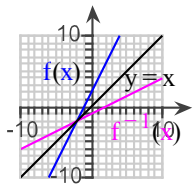
○ A.



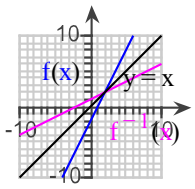
○ B.



○ C.



○ D.



21. The function $f(x) = 8x + 2$ is one-to-one.
(a) Find the inverse of f.
(b) State the domain and range of f.
(c) State the domain and range of f^{-1}.
(d) Graph f, f^{-1}, and $y = x$ on the same set of axes.

(a) What is the inverse of f?

$f^{-1}(x) =$ ☐
(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(b) State the domain and range of f. Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. The domain of f is {x| ☐ }. The range of f is {y| ☐ }.
(Simplify your answers. Type an inequality or a compound inequality.)
- ○ B. The domain of f is {x| ☐ }. The range of f is all real numbers.
(Simplify your answer. Type an inequality or a compound inequality.)
- ○ C. The domain of f is all real numbers. The range of f is {y| ☐ }.
(Simplify your answer. Type an inequality or a compound inequality.)
- ○ D. The domain and range of f are all real numbers.

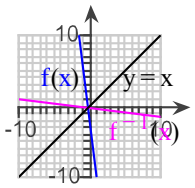
(c) State the domain and range of f^{-1}. Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. The domain of f^{-1} is {x| ☐ }. The range of f^{-1} is {y| ☐ }.
(Simplify your answers. Type an inequality or a compound inequality.)
- ○ B. The domain of f^{-1} is {x| ☐ }. The range of f^{-1} is all real numbers.
(Simplify your answer. Type an inequality or a compound inequality.)
- ○ C. The domain of f^{-1} is all real numbers. The range of f^{-1} is {y| ☐ }.
(Simplify your answer. Type an inequality or a compound inequality.)
- ○ D. The domain and range of f^{-1} are all real numbers.

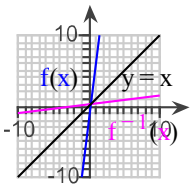
(d) Graph f, f^{-1}, and $y = x$ on the same set of axes. Choose the correct graph below.

21. (cont.)

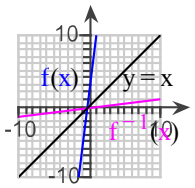
○ A.


10
f(x)
y = x
-10
10
f⁻¹(x)
-10

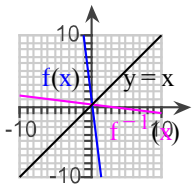
○ B.


10
f(x)
y = x
-10
10
f⁻¹(x)
-10

○ C.


10
f(x)
y = x
-10
10
f⁻¹(x)
-10

○ D.


10
f(x)
y = x
-10
10
f⁻¹(x)
-10

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1. the third choice

2. A

3. $(x+3)(x+1)(x-3)(x-5)$

4. $x^3 + 5x^2 + 8x + 4$

5. A, 4, -7

6. A, 5, $-\frac{1}{2}$

7. B

8. A, -8
   A, 14
   B

9. A, 0
   A, 0
   B

10. B

11. 198
    146
    9
    18

12. 31
    $-\frac{41}{2}$
    1
    -4

13. $6\sqrt{2}$
$6\sqrt{2}$
$3\sqrt{3}$
0

14. x
x
the first choice

15. x
x
the first choice

16. the first choice

17. the third choice
the first choice
the first choice

18. x
B
x
B
the first choice

19. B

20. $\frac{x}{2}$
B
B
B
B
A

21. $\frac{x}{8} - \frac{1}{4}$

D

D

C