

Math 52, Fall 2014 Final Exam

Instructor's name: _____

Directions

1. Time limit: 1 hour 50 minutes.
2. There are 100 points possible for this exam. The point value for each problem is shown, either for each section or by individual problem.
3. For any partial credit to be possible you must show work that explains how you obtained your answer or you must explain how you obtained your answer.
4. Your work must be neat, organized, and legible. Place answers on the line to the right of the problem where provided; otherwise box your solution.
5. You may use a calculator, but you may not use any notes, books or other sources. You may not use a cell phone, tablet, PDA, etc. Use of a cell phone during the exam may result in a zero grade for this exam.
6. If a problem does not specify that an answer be written in fraction notation, mixed number notation, or decimal notation, then write the answer in the notation that you think is most appropriate for the problem. *All numerical fractions must be expressed in lowest terms.*
7. You are expected to do your own work. You are neither to receive nor to give any help on the exam.

I have read and agree to the directions above.

Signature: _____

Printed Name: _____

For this first set of eight (8) problems, simplify the following expressions. Write your answers in the space provided. Rationalize all denominators. Write complex numbers in the form $a + bi$. Each problem in this section is worth 3 points except problem 8 which is worth 2 points as noted on the next page.

1) $3\sqrt{2}(\sqrt{10} + 5\sqrt{8})$ Ans: _____

2) $\sqrt{\frac{x^6y^3}{12z}}$ Ans: _____

3) $\frac{2x-6y}{7xy^2} \div \frac{3x-9y}{14y}$ Ans: _____

4) $\frac{4x^2+4x-120}{x^2-2x-15}$ Ans: _____

5) $x^{2/3}(x + 2x^{1/3} - x^{-2/3})$ Ans: _____

Continued:

Simplify the following expressions. Write your answers in the space provided. Rationalize all denominators. Write complex numbers in the form $a + bi$.

6) $64^{-2/3}$ **Ans:** _____

7) $\frac{5i}{3-4i}$ **Ans:** _____

8) $(3 + 2i)(1 + 7i)$ **Ans:** _____ (2 pts)

Simplify the following complex rational expression.

9) $\frac{3x^{-1}+y^{-2}}{\frac{3x}{y}}$ **Ans:** _____ (3 pts)

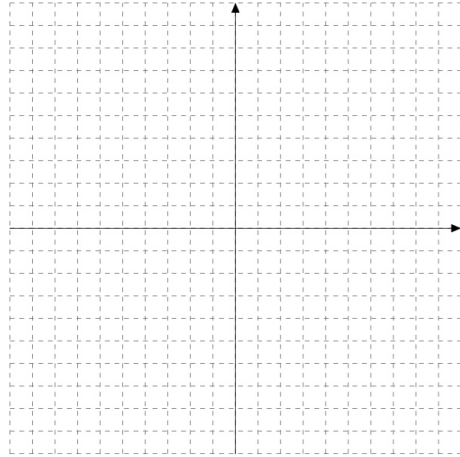
Find the center and radius for the circle given below. Write your answers in the spaces provided.

10) $x^2 + y^2 - 6x + 10y = 6$ **center:** _____ (2 pts) **radius:** _____ (1 pt)

Sketch the graphs of the following equations for 3 points each. Identify any asymptotes as dashed lines. Answer the associated question for each.

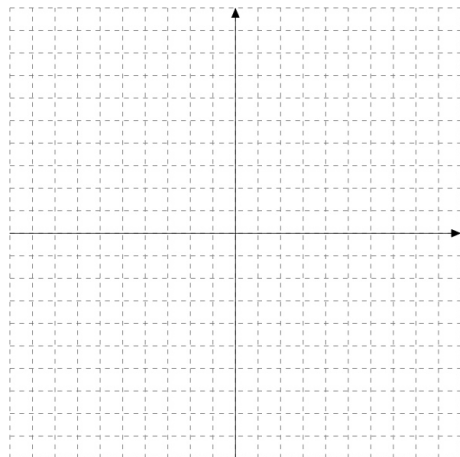
11) $f(x) = 3^x - 2$

Where is the y-intercept? _____



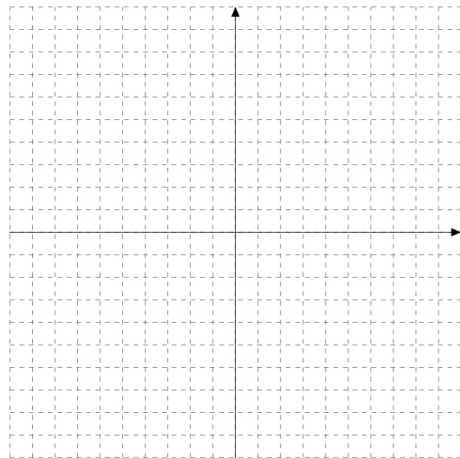
12) $y = x^2 - 4x - 5$

Where is the vertex? _____



13) $x = -2(y + 1)^2 - 3$

Where is/are the x-intercept(s)? _____



- 14) Given the functions $f(x) = x - 3$ and $g(x) = x^2 - 2x$, find the following (for 1 pt each) and answer on the lines provided.

Find the composite function: $(f \circ g)(x)$?: _____

Find the value of: $(f \circ g)(-2)$?: _____

Find the composite function: $(g \circ f)(x)$?: _____

For what value(s) of x is $g(x) = 8$?: _____

Find the inverse for each of the following functions. Use appropriate function notation for your answer. (2 pts each)

<p>15) $f(x) = \sqrt[3]{x + 5}$</p>	<p>16) $f(x) = \frac{2}{3}x + 6$</p>
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For the following inequality graph the solution and also write the solution in interval notation. (4 pts)

17) $x^2 + x - 12 > 0$ Graph:



Solution in interval notation: _____

Solve the following equations with exact answers (no decimal values). Point values are noted for each problem.

18) $\frac{x}{x+2} = \frac{5}{x-3}$

Ans: _____ (3 pts)

19) $\sqrt{3x+1} = x-1$

Ans: _____ (4 pts)

20) $4t^4 - 9t^2 + 2 = 0$

Ans: _____ (4 pts)

21) $(2x+3)^2 = 18$

Ans: _____ (3 pts)

Solve the following equations with exact answers (no decimal values). Point values are noted for each problem.

22) $\log_2 x - \log_2(x - 1) = 3$

Ans: _____ (3 pts)

23) $\ln(x-2) = 3$

Ans: _____ (3 pts)

24) $\frac{t}{t+3} + \frac{2}{t-4} = \frac{14}{t^2-t-12}$

Ans: _____ (3 pts)

Solve the following systems of equations for all real solutions. Point values are noted for each problem.

$$25) \begin{cases} 3x - 2y = 8 \\ 4x - 3y + z = 17 \\ x - y - z = -7 \end{cases}$$

Ans: _____ (5 pts)

$$26) \begin{cases} x^2 + y^2 = 25 \\ x = y^2 - 5 \end{cases}$$

Ans: _____ (5 pts)

Solve the following application problems. Each word problem is worth 4 points.

- 27) Working together Paul and Art can build a bridge for a landscaping project in 4 hours. Working alone it would take Paul 15 hours longer than Art. How long would it take Art to build the bridge working alone?

Time for Art to build the bridge? _____

- 28) A crudely built potato gun will launch a potato so that its height t seconds after launch will be given by, $h(t) = -16t^2 + 112t + 8$ feet. What is the maximum height the potato reaches?

Maximum height: _____

Solve the following application problems. Point values are noted for each problem.

29) The Bank of Goldman Sux offers an investment that pays 2.3% per year, compounded continuously. For each question below use the compound interest formula $A = Pe^{rt}$.

(a) If \$3000 is invested, what will the investment be worth in $2\frac{1}{2}$ years? Round your answer to the nearest dollar.

Amount?: _____ (3 pts)

(b) How long will it take for the \$3000 investment to grow to \$4500? Round your answer to the nearest tenth.

How long?: _____ (3 pts)

30) The stopping distance of a car varies directly with the square of the cars speed. A car traveling at 65 mph requires 212 feet to stop. What distance would be required to stop if the same car is traveling 80 mph? Round your answer to the nearest tenth of a foot.

Distance: _____ (3 pts)