

# MISSOURI S&T

## Math 1215, Exam 1 Preparation Package

Exam 1 will be on Thursday, February 10, 5 – 5:50 pm.

**Please check your room assignments below:**

Labs 301, 305, 306, and 310 (Wang) - BCH 120

Labs 302, 303, 307, and 308 (Kovach) - H-SS G5

Labs 304, 309, 311, and 312 (Yuan) - McNutt 204

**For DSS students**, be sure to be in contact with the Testing Center. Exams will be taken at the same day and time (plus some possible extra time) as the regularly scheduled exam.

**If you are sick or in quarantine**, e-mail me no later than 4:30 pm on the day before the exam to arrange for alternate testing accommodation at the same day and time as the regularly scheduled exam.

**This preparation package contains**, besides the information on this page, a list of things that you should know, and a practice exam that features the exact instructions and the same formula sheet as the one on the real exam as well as ten practice problems that are similar to the ones on the real exam. Please work through them. The review on Wednesday will consist of an asynchronous zoom posting of me working out these practice problems.



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## Math 1215, Exam 1

**You should be able to do all of the following**

1. Know how to calculate volumes of solids of revolution by the washer method (Section 6.3).
2. Know how to calculate volumes of solids of revolution by the shell method (Section 6.4).
3. Know how to calculate the arc length of curves (Section 6.5).
4. Know how to calculate surfaces of solids of revolution (Section 6.6).
5. Know the properties of inverse functions. Know how to calculate their derivatives (Section 7.1).
6. Know the properties of the natural exponential function and the natural logarithm function. Know how to calculate their derivatives and integrals (Section 7.2).
7. Know the properties of the general exponential function and the general logarithm function. Know how to calculate their derivatives and integrals (Section 7.3).
8. Know the definitions and properties of the inverse trigonometric functions. Know how to calculate their derivatives and integrals (Section 7.5).
9. Know how to calculate limits using l'Hôpital's rule (Section 7.6).



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## Math 1215, Practice Exam 1

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### Instructions

1. Be sure to clearly print your name in the space provided at the top of each page.
2. No calculators, books, or other materials are permitted.
3. This exam has 6 sheets of paper (front and back). *Do not remove the staple!* There are 100 points. Each of the ten problems is 10 points. Once this exam starts, you have 50 minutes. This means you have about 5 minutes for each of the 10 problems.
4. You must write darkly and legibly – this exam will be scanned for electronic grading.
5. Work all problems. Show all work. Full credit will be given only if work is shown which fully justifies your answer.
6. There will be sufficient space under each problem in which to show your work. No extra paper is allowed.
7. Place each final answer in the provided box. *All final answers must be simplified!*
8. **Turn off your cell phone if you have one with you.**

**Do not turn this page until told to do so.**



# MISSOURI S&T

Potentially useful Formulas.

$$L = \int_a^b \sqrt{1 + (f'(x))^2} dx$$

$$S = \int_a^b 2\pi f(x) \sqrt{1 + (f'(x))^2} dx$$

$$(f^{-1})'(x) = \frac{1}{f'(f^{-1}(x))}$$

$$\int \sec(x) dx = \ln |\sec(x) + \tan(x)| + c$$

$$\int \frac{dx}{\sqrt{1-x^2}} = \sin^{-1}(x) + c$$

$$\int \frac{dx}{1+x^2} = \tan^{-1}(x) + c$$

$$\int \frac{dx}{x\sqrt{x^2-1}} = \sec^{-1} |x| + c$$

$$\cos\left(\frac{\pi}{4}\right) = \sin\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$$



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# Practice Problem Number 1.

Find the volume of the solid formed by revolving the region bounded by  $f(x) = \sqrt{x}$  and  $g(x) = x$  about the  $x$ -axis.

Answer: (one character per box)	<input type="text"/> <input type="text"/>
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## Practice Problem Number 2.

Find the volume of the solid formed by revolving the region bounded by  $y = 1 - x$  and the  $x$ -axis in the first quadrant about the  $y$ -axis.

Answer: (one character per box)	<input type="text"/> <input type="text"/>
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# Practice Problem Number 3.

Find the arc length of the curve  $x = \frac{2}{3}(y - 1)^{3/2}$  for  $1 \leq y \leq 4$ .

Answer: (one character per box)	<input type="text"/>	<input type="text"/>
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	<input type="text"/>	



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## Practice Problem Number 4.

Find the area of the surface generated when the graph of  $y = \sqrt{9 - x^2}$  for  $-2 \leq x \leq 2$  is rotated about the  $x$ -axis.

Answer:  
(one character per box)



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## Practice Problem Number 5.

If  $f(x) = x^2 + e^x$ , find  $(f^{-1})'(1)$ .

Answer:  
(one character per box)

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## Practice Problem Number 6.

Find the integral  $\int_e^{e^2} \frac{dx}{x \ln^2(x)}$ .

Answer:  
(one character per box)




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Practice Problem Number 7.

Find the integral  $\int_3^4 4^x dx$ .

Answer: (one character per box)	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>

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## Practice Problem Number 8.

Consider the intervals

(A)  $(-\infty, \infty)$

(B)  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

(C)  $[-1, 1]$

(D)  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

(E)  $[0, \pi]$ .

Now put in the first box below the letter that corresponds to the domain of the inverse sine, put in the middle box below the letter that corresponds to the domain of the inverse tangent, and put in the last box below the letter that corresponds to the domain of the inverse cosine.

Answer:  
(one character per box)

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## Practice Problem Number 9.

Find the integral  $\int_0^{\frac{1}{4}} \frac{dx}{\sqrt{\frac{1}{16} - x^2}}$ .

Answer:  
(one character per box)




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Practice Problem Number 10.

Evaluate  $\lim_{x \rightarrow 0^+} \sqrt{x} \ln(x)$ .

<p>Answer: (one character per box)</p> <div data-bbox="1182 1738 1328 1885" style="border: 2px solid black; width: 60px; height: 60px; margin-left: auto; margin-right: auto;"></div>
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