

Math 18 - Test #2 Info and Review Exercises

Fall 2018, Prof. Beydler

Test Info

- Date: Monday, October 15, 2018
- Will cover worksheets E through G.
- You'll have 1 hour to finish the test.
- For this test, you'll need a **scientific calculator**.
- No notes, no books, no phones, no smart watches during the test.
- There will be a seating chart for the test.
- Where to get help as you're studying:
 - Office hours
 - TMARC, LAC, or other tutoring centers
 - E-mail me at dbeydler@mtsac.edu

Review Exercises

Note: If you write up the answers to all of the review exercises listed below, and hand them in at the test, you can earn up to 2% extra credit towards your test (depending on neatness and completeness)! It is important to understand that these review exercises are not guaranteed to cover all of the potential problems on the test. Please review the worksheets to fully prepare for the test.

1. Factor each of the following. You will need to factor out a binomial $(a + b)^n$

a) $12x^2(x + 3)^4(2x + 1) - 18x^3(x + 3)^5(2x + 1)^2$

b) $(x^2 + 3)^4 \cdot 3(3x - 1)^2 \cdot 3 + 4(x^2 + 3)^3 \cdot 2x \cdot (3x - 1)^3$

2. Given $f(x) = \sqrt{x + 2}$, $g(x) = \ln x$, and $h(x) = x^2 - 1$, evaluate

a) $(f \circ g)(e^2)$

b) $h(f(-3))$

c) $(g \circ f)(\sin x)$

d) $f(g(h(x)))$

3. Find $f \circ g$ and $g \circ f$ for the following functions.

a) $f(x) = \log x$, $g(x) = 2x + 1$

$$f \circ g = \underline{\hspace{2cm}}$$

$$g \circ f = \underline{\hspace{2cm}}$$

Domain of $f \circ g$: $\underline{\hspace{2cm}}$

b) $f(x) = x^2 - 4$, $g(x) = \sqrt{x}$

$$f \circ g = \underline{\hspace{2cm}}$$

$$g \circ f = \underline{\hspace{2cm}}$$

Domain of $g \circ f$: $\underline{\hspace{2cm}}$

4. Decompose the following functions. Make sure none of your functions are just x .

a) $f(g(x)) = \cos^{-1} \sqrt{x}$

$$f(x) = \underline{\hspace{2cm}}$$

$$g(x) = \underline{\hspace{2cm}}$$

b) $f(g(h(x))) = \frac{1}{(\ln(2x-1))^2}$

$$f(x) = \underline{\hspace{2cm}}$$

$$g(x) = \underline{\hspace{2cm}}$$

$$h(x) = \underline{\hspace{2cm}}$$

c) $f(g(h(x))) = 2^{\csc(x^3+1)}$

$$f(x) = \underline{\hspace{2cm}}$$

$$g(x) = \underline{\hspace{2cm}}$$

$$h(x) = \underline{\hspace{2cm}}$$

d) $f(g(h(r(x)))) = \sqrt{\frac{1}{\log(e^x)}}$

$$f(x) = \underline{\hspace{2cm}}$$

$$g(x) = \underline{\hspace{2cm}}$$

$$h(x) = \underline{\hspace{2cm}}$$

$$r(x) = \underline{\hspace{2cm}}$$

5. Each of the following functions is a combination of two or more functions of the variable x . They are either a sum, difference, product, quotient, composition or combination of these. Describe each in words. Don't just write "product" but follow the example shown and specify the functions.

Example: $x^2 \cos(2x + 1)$ is a product of x^2 and $\cos(2x + 1)$ and a composition of $2x + 1$ inside $\cos x$

a) $\sqrt{x} \sin(x^2 + 1)$

b) $\ln x - \sqrt[3]{\tan x}$

c) $\frac{x^3}{\sin^2 x}$

6. Solve each of the following equations.

a) $2 \sin x \cos^2 x + \sqrt{3} \cos^2 x = 0$

b) $\sin x \cos x + \sin^2 x = 0$

7. Solve the following inequalities.

a) $2x^3 + x^2 - 18x - 9 > 0$

b) $(2x + 3)(x - 5)^3(x + 2)^2 \leq 0$

8. Expand each of the following expressions using the properties of logarithms.

a) $\ln x^{\cos x}$

b) $\log_3 \frac{2x^2(x+1)^3}{9(x-2)^4}$

$$c) \log_2 \sqrt[3]{\frac{\tan^2 x}{24x^2 + 40x - 16}}$$

$$d) \ln \left(\frac{e^{\csc x} \cdot (x^2 + 7)^4}{\sqrt[5]{x} \cdot \sin x} \right)$$

9. Determine whether each statement is true or false.

a) $\ln x^3 = 3 \ln x$

b) $\ln \sqrt[3]{x + y} = \frac{1}{3} \ln x + \frac{1}{3} \ln y$

c) $(\log x)^2 = 2 \log x$

d) $\sqrt{\log x} = \frac{1}{2} \log x$