

# Math 117 Final Exam Review Problems

These problems are intended to help you prepare for the test. **The Final Exam is cumulative.** These are problems that only cover Unit 3. Use the Exam 1 and Exam 2 reviews to study for previous sections.

**This list of problems is not all inclusive and does not represent every possible type of problem.** It is suggested that you review old practice exams, lectures, classwork problems, and homework problems in addition to this review.

**Due on the day of the exam.**

(1) Consider the function  $f(x) = \frac{2x^2}{x^2-4}$

(a) Find any intercepts

(c) Sketch a graph of  $f$

(b) Find any asymptotes

(2) Consider the function  $f(x) = \frac{x^2-9}{x-4}$

(a) Find any intercepts

(c) Sketch a graph of  $f$

(b) Find any asymptotes

(3) Evaluate the expressions by hand

(a)  $(36^{3/4})^2$

(c)  $(\frac{4}{9})^{-3/2}$

(b)  $(9^{-3/2})^{-2}$

(d)  $81^{3/4}$

(4) Solve the following equations:

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

(c)  $\frac{1}{x+1} + \frac{1}{x-2} = \frac{4}{x^2-4}$

(b)  $\frac{1}{x} - \frac{1}{x^2} + 2 = 0$

(5) Solve the following inequalities

(a)  $x^3 + x^2 - 6x > 0$

(c)  $\frac{2x-1}{x+2} > 0$

(b)  $x^4 + 4 < 5x^2$

(6) Solve the following equations.

(a)  $x^2 + 11x + 30 = 0$

(c)  $2x^3 - 2x^2 - 18x + 18 = 0$

(b)  $x^2 = 8x - 7$

(d)  $x^{2/3} - 4x^{1/3} - 5 = 0$

(7) Solve the following equations for  $x$ :

(a)  $5x^{3/2} = 135$

(c)  $\sqrt[3]{2x-3} + 1 = 4$

(b)  $\sqrt{36-5x} = x$

(d)  $\sqrt{x-2} = 5 - \sqrt{x+3}$

(8) Answer the following questions:

(a) Let  $f(x) = x - 8$  and let  $g(x) = 4x^2$ .

i. Find  $(f+g)(x)$

iii. Find  $(fg)(x)$

ii. Find  $(f-g)(x)$

iv. Find  $\left(\frac{f}{g}\right)(x)$

(b) Let  $f$  and  $g$  be defined by the following tables

$x$	-1	0	1	3
$f(x)$	3	5	7	9

$x$	-1	0	1	3
$g(x)$	-2	0	1	9

i. Find  $(f+g)(1)$

iii. Find  $(fg)(-1)$

ii. Find  $(f-g)(3)$

iv. Find  $\left(\frac{f}{g}\right)(0)$

(9) Let  $f(x) = -3x^2$  and let  $g(x) = x + 6$ .

(a) Find  $(f \circ g)(x)$

(c) Find  $(f \circ f)(x)$

(b) Find  $(g \circ f)(x)$

(d) Find  $(g \circ g)(x)$

(10) Solve the following inequalities. **Write your answers in interval notation.**

(a)  $(3x+6)(x-1)(x-3) \leq 0$

(b)  $-8 < \frac{4-2x}{3} < 0$

(c)  $\frac{x^2 - 10x + 16}{x^2} \geq 0$

(11) Perform the indicated operation:

(a) Add  $\frac{5}{x+2} + \frac{2}{x^2-4}$

(b) Simplify  $16^{1/12} \cdot 16^{1/6}$  (Note: the  $\frac{1}{12}$  and  $\frac{1}{6}$  are **exponents** of the 16)

(c) Divide  $\frac{1+2i}{3-i}$

(12) Consider the function  $f(x) = \frac{2x-6}{x+1}$

(a) Find the  $x$ -intercept(s) and  $y$ -intercept.

(b) Find the equation(s) of any vertical, horizontal, or slant asymptotes.

(c) Sketch a graph of  $f(x)$

(13) Solve the following equations:

(a)  $x^3 + 3x^2 - x - 3 = 0$

(b)  $\frac{2}{x+5} + \frac{4}{x} = 1$

(c)  $\sqrt[3]{4x-3} + 8 = 5$

(14) Consider  $f(x) = x^2 - 3x$  and  $g(x) = 2x - 5$

(a) Find  $(f + g)(x)$

(b) Find  $\left(\frac{f}{g}\right)(-2)$

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