

Math 165 Exam 2 Review Guide

Note: This is only a review guide. It is your responsibility to determine the extent of your study resources, which should include the lecture notes and homework problems I assigned from your textbook.

- 1) Let $f(x) = 3x + 1$ and $g(x) = x - 1$. Compute each of the following: (A) $(f + g)(x)$ (B) $(f - g)(x)$
(C) $(fg)(x)$ (D) $\left(\frac{f}{g}\right)(x)$. Determine the domains of $f + g, f - g, fg$, and $\frac{f}{g}$.
- 2) Let $f(x) = x^2$ and $g(x) = 3x + 1$. Compute each of the following: (A) $(f \circ g)(x)$ (B) $(g \circ f)(x)$
(C) $(f \circ g)(-2)$
- 3) Let $h(x) = \sqrt{2 + x^4}$. Express the function as a composition of two simpler functions f and g .
- 4) Let $f(x) = \frac{x-1}{2x+7}$. Find $f^{-1}(x)$.
- 5) Graph the function $f(x) = -2x^2 + 4x + 6$ and specify the vertex, axis of symmetry, maximum or minimum value of f and the x - and y -intercepts.
- 6) Graph the function $f(x) = \frac{x^2 - x - 6}{x^2 - x - 2}$. Find the domain, x - and y -intercepts, vertical asymptote(s), and horizontal asymptote(s).
- 7) Graph the function $g(x) = -2^x + 1$. Find the domain, range, x - and y -intercepts, and asymptote.
- 8) Solve each equation for x : (A) $2^{3x+1} = \sqrt{2}$ (B) $3^x = 9\sqrt{3}$ (C) $e^{2x+3} = 10$ (D) $10^{2x-1} = 145$
- 9) Find the domain of the function $y = \log(3 - 4x)$. Write your final answer in interval notation.
- 10) Evaluate each expression: (A) $\log_4\left(\frac{1}{32}\right)$ (B) $\log_2 8\sqrt{2}$
- 11) Find all real-number roots of the equations: (A) $\ln(\ln x) = 2$ (B) $\log(x^2 - 2x) = 3$
(C) $\log_3 x + \log_3(x + 2) = 1$
- 12) Suppose that $\triangle ABC$ is a right triangle with $\angle C = 90^\circ$. If $AC = 6$ and $BC = 2$, find the six trigonometric functions of angle A .
- 13) Simplify: (A) $\frac{\sin^2\theta - \cos^2\theta}{\sin\theta - \cos\theta}$ (B) $\frac{\cos^2 A + \cos A - 12}{\cos A - 3}$
- 14) Given θ is an acute angle and $\cos\theta = \frac{8}{17}$, determine the exact values of the remaining trigonometric functions.
- 15) A ladder 18 ft long leans against a building. The ladder forms an angle of 60° with the ground. (A) How high up the side of building does the ladder reach? (B) Find the horizontal distance from the foot of the ladder to the base of the building?
- 16) From a point level with and 1000 feet away from the base of the Washington Monument, the angle of elevation to the top of the monument is 29.05° . Determine the height of the monument to the nearest half foot.
- 17) Find the exact values of each expression without using a calculator by sketching the angle in standard position, finding the reference angle, the given trig function of the reference angle with appropriate sign affixed:
(A) $\sin(-120^\circ)$ (B) $\sec(-135^\circ)$ (C) $\cos\left(\frac{7\pi}{6}\right)$ (D) $\cot\left(-\frac{2\pi}{3}\right)$ (E) $\tan\left(\frac{5\pi}{4}\right)$ (F) $\csc(-600^\circ)$
- 18) Use the unit circle to evaluate the trigonometric functions of -180° .