

Final Exam Study Guide

Overview: The final exam is cumulative. The exam will be structured as follows:

1. 1/3 of questions will cover topics from Exam 1. Specifically, Sections 1.1-1.5, 1.7, 2.1-2.3, 3.2-3.4.
2. 1/3 of questions will cover topics from Exam 2. Specifically, Sections 3.5-3.7, 4.1-4.6, 5.1-5.4.
3. 1/3 of questions will cover topics from after Exam 2. Specifically, Sections 6.1-6.3, 7.1-7.3, 7.5.

The best way to study for parts 1 and 2 will be to rework the old exams. The problems I choose for those parts will be similar (but not identical!) to those encountered on the exams. The blank exam files and answer keys are posted on my [website](#).

The best way to study for the third part is to practice more problems. I have included a list of practice problems for Sections 6.1-6.3, 7.1-7.3, 7.5 below.

Practice Problems: The following problems are meant to help you review the things we learned in Sections 6.1-6.3, 7.1-7.3, 7.5. The skills required to solve these problems will be useful on the exam. However, this is not a practice exam - the problems you encounter on the exam may be new. Problems from the textbook have the answers linked.

- (6.1.13) Graph two full periods of $f(x) = 4 \cos \pi x$ and state the amplitude, period, and midline.
- (6.1.19) Graph one full period of $f(x) = \cos(t + \pi/3) + 1$ starting at $x=0$. State the amplitude, period, and midline.
- Sketch two periods of the graph of $f(x) = \pi \tan(\pi x - \pi)$. Identify the stretching factor, period, and asymptotes.
- (6.2.29) Sketch two periods of the graph of $f(x) = 4 \sec(3x)$. Identify the stretching factor, period, and asymptotes.
- (6.2.33) Sketch two periods of the graph of $f(x) = 2 \csc(x + \pi/4) - 1$. Identify the stretching factor, period, and asymptotes.
- Evaluate:
 - (a) (6.3.9) $\sin^{-1}(-1/2)$
 - (b) (6.3.11) $\cos^{-1}(-\sqrt{2}/2)$
 - (c) (6.3.13) $\tan^{-1}(-\sqrt{3})$.
 - (d) (6.3.25) $\tan^{-1}(\sin(\pi))$
 - (e) (6.3.27) $\tan^{-1} \sin(\pi/3)$
 - (f) (6.3.33) $\sin(\cos^{-1}(3/5))$
 - (g) (6.3.35) $\cos(\tan^{-1}(12/5))$
 - (h) (6.3.37) $\tan(\sin^{-1}(x - 1))$
 - (i) (6.3.39) $\cos(\sin^{-1}(1/x))$
- Verify the identities:
 - (a) $\cos x - \cos^3 x = \cos x \sin^2 x$
 - (b) $\cos^2 x - \tan^2 x = 2 - \sin^2 x - \sec^2 x$

- (c) $\frac{\cos(a+b)}{\cos a \cos b} = 1 - \tan a \tan b.$
- (d) $\cos(x+y)\cos(x-y) = \cos^2 x - \sin^2 y$
- (e) $\sin(2x) = 2\sin x \cos x$
- (f) $\cot x - \tan x = 2\cot(2x)$
- Evaluate:
 - (a) (7.2.5) $\cos(\pi/12)$
 - (b) (7.2.7) $\sin(11\pi/12)$
 - (c) (7.2.9) $\tan(19\pi/12)$
 - (7.2.21) Find $\sin(a-b)$ and $\cos(a+b)$ given that $\sin a = 4/5$ and $\cos b = 1/3$ where a, b are in the interval $[0, \pi/2)$.
 - Find $\sin(2x)$, $\cos(2x)$, and $\tan(2x)$ in the following scenarios:
 - (a) (7.3.5) $\sin x = 1/8$ and x is in quadrant I
 - (b) (7.3.7) $\cos x = -1/2$ and x is in quadrant III.
 - Find all solutions on the interval $0 \leq \theta < 2\pi$
 - (a) (7.5.5) $2\sin \theta = \sqrt{3}$
 - (b) (7.5.9) $\tan \theta = 1$
 - (c) (7.5.11) $4\sin^2 \theta - 2 = 0$
 - (d) (7.5.13) $\cos \theta = \sqrt{2}$
 - (e) (7.5.17) $2\sin 3\theta = 1$
 - (f) (7.5.21) $2\sin \pi\theta = 1$
 - (g) (7.5.25) $2\cos^2 \theta + \cos \theta = 1.$
 - (h) (7.5.39) $\cos 2\theta = \sin \theta$
 - (i) (7.5.53) $\cos 2\theta - \cos \theta = 0$
 - (j) (7.5.55) $1 - \cos 2\theta = 1 + \cos 2\theta$