

# Math 262 Test 2 Study Guide

$$(1) \lim_{x \rightarrow 0} \frac{x^3}{\sin x - x}$$

$$(2) \lim_{x \rightarrow 0} \frac{\cos x - \sin^2 x}{\sin x}$$

$$(3) \lim_{x \rightarrow -\infty} x \sin\left(\frac{1}{x}\right)$$

$$(4) \lim_{x \rightarrow \infty} \frac{9x + 4}{3 - 2x}$$

$$(5) \lim_{x \rightarrow 0} \frac{\sin(2x)}{\sin(7x)}$$

$$(6) \lim_{x \rightarrow 0} \frac{\tan x}{x}$$

$$(7) \lim_{x \rightarrow 1} \tan\left(\frac{\pi x}{2}\right) \ln(x)$$

$$(8) \lim_{x \rightarrow 0^+} \sin x \ln x$$

$$(9) \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^{x^2}$$

$$(10) \lim_{x \rightarrow 0} (\cos x)^{3/x^2}$$

use IBP to integrate

$$(11) \int x \sin(\pi x) dx$$

$$(12) \int x^2 e^x dx$$

$$(13) \int x \sin(2\pi x) dx$$

$$(14) \int \ln^2(x) dx$$

$$(15) \int \sin^{-1}(x) dx$$

$$(16) \int x^{-5} \ln(x) dx$$

$$(17) \int x \ln^2(x) dx$$

$$(18) \int e^x \cos(2x) dx$$

Integrate the following Trigonometric Integrals

$$(19) \int \sin^2(x) \cos^2(x) dx$$

$$(20) \int \cos^3(2x) dx$$

$$(21) \int \sin^2(4x) dx$$

$$(22) \int \cos^5(x) \sin(x) dx$$

$$(23) \int \tan(x) \sec^2(x) dx$$

$$(24) \int \tan^6(x) \sec^4(x) dx$$

$$(25) \int \cos^{10}(x) \sin^3(x) dx$$

$$(26) \int \sin(4x) \cos(2x) dx$$

$$(27) \int \sin(x) \sin(5x) dx$$

$$(28) \int \cos(3x) \cos(x) dx$$

use Trigonometric Substitution to Integrate.

$$(29) \int \frac{x^4}{\sqrt{1-x^2}} dx$$

$$(30) \int \frac{1}{x\sqrt{x^2+16}} dx$$

$$(31) \int \sqrt{9+x^2} dx$$

$$(32) \int \frac{1}{x^2\sqrt{x^2-25}} dx$$

$$(33) \int \frac{1}{(x^2-4)^2} dx$$

$$(34) \int \sqrt{x^2-4x+7} dx$$

$$(35) \int \frac{1}{\sqrt{2+x-x^2}} dx$$

use partial fraction Decomposition  
to integrate.

$$(36) \int \frac{1}{x(3x+1)} dx$$

$$(37) \int \frac{x^2}{x^2+9} dx$$

$$(38) \int \frac{1}{(x-1)^2(x-2)^2} dx$$

$$(39) \int \frac{3x^2 - 4x + 5}{(x-1)(x^2+1)} dx$$

$$(40) \int \frac{x^2}{(x+1)(x^2+1)} dx$$

$$(41) \int \frac{1}{x(x^2+8)^2} dx$$

$$(42) \int \frac{x^2+3}{(x^2+2x+3)^2} dx$$