MATH 101 Test 2 Formulas

The essentials you should know

The following formulas are the most important formulas from sections 7.6-7.7, 8.1-8.5, 8.7, 5.6 and 8.8. You should know all of these for Test 2 (and the final exam) in addition to the Test 1 formulas and MATH 100 and precalculus formulas, identities, etc.

$$\text{Mass: } m = \rho A = \rho \int_a^b [f(x) - g(x)]\, dx \quad \text{or} \quad \rho \int_c^d [f(y) - g(y)]\, dy$$

Moments of mass about the x-axis and y-axis, respectively:

$$M_x = \rho \int_a^b \left[\frac{f(x) + g(x)}{2}\right] [f(x) - g(x)]\, dx \quad \text{or} \quad \rho \int_c^d y[f(y) - g(y)]\, dy$$

$$M_y = \rho \int_a^b x[f(x) - g(x)]\, dx \quad \text{or} \quad \rho \int_c^d \left[\frac{f(y) + g(y)}{2}\right] [f(y) - g(y)]\, dy$$

$$\text{Center of mass: } (\overline{x}, \overline{y}) = \left(\frac{M_y}{m}, \frac{M_x}{m}\right)$$

$$\text{Theorem of Pappus: } V = 2\pi r A$$

$$\text{Fluid Force: } F = w \int_c^d h(y) L(y)\, dy$$

$$\text{Integration by parts: } \int u\, dv = uv - \int v\, du$$

$$\sin^2 x + \cos^2 x = 1 \qquad 1 + \tan^2 x = \sec^2 x \qquad 1 + \cot^2 x = \csc^2 x$$

$$\sin^2 x = \frac{1 - \cos 2x}{2} \qquad \cos^2 x = \frac{1 + \cos 2x}{2}$$

$$\int \sec^3 x\, dx = \frac{1}{2} \sec x \tan x + \frac{1}{2} \ln |\sec x + \tan x| + C$$

for trigonometric substitution, if given...

- $\sqrt{a^2 - x^2}$, then let $x = a \sin \theta$
- $\sqrt{a^2 + x^2}$, then let $x = a \tan \theta$
- $\sqrt{x^2 - a^2}$, then let $x = a \sec \theta$

$$\lim_{x \to c} \frac{f(x)}{g(x)} = \lim_{x \to c} \frac{f'(x)}{g'(x)} \qquad \text{[L'Hôpital's Rule for limits of the form } 0/0 \text{ or } \infty/\infty\text{]}$$