

# 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.

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

Moment of mass about the  $x$ -axis:

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

Moment of mass about the  $y$ -axis:

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

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

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

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

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

$$\sin^2 x + \cos^2 x = 1 \quad \sec^2 x - \tan^2 x = 1 \quad \sin^2 x = \frac{1 - \cos 2x}{2} \quad \cos^2 x = \frac{1 + \cos 2x}{2}$$

for trigonometric substitution, if given...

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

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

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

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