(1) The graph of \( x = f(y) \) is the graph of \( y = f(x) \) reflected across the line \( y = x \).

(2) The area between \( f(x) \) and \( g(x) \) from \( a \) to \( b \) is

(3) The \( \int_a^b f(x) \) of \( f(x) \) over the interval \([a, b]\) is

(4) The Mean Value Theorem for Integrals says that if \( f \) is continuous on \([a, b]\) with mean value \( M \), then there is some \( c \in [a, b] \) such that

(5) If a shape has cross-sectional area \( A(y) \) and height extends from \( y = a \) to \( y = b \), then its volume is

(6) Cavilieri’s Principle says if two solids have equal \( \text{Volume} \), then they also have equal \( \text{Volume} \).

(7) The Disk Method: If \( f(x) \geq 0 \) on \([a, b]\), then the solid obtained by rotating the region under the graph around the \( x \)-axis has volume

(8) The Washer Method: If \( f(x) \geq g(x) \geq 0 \) on \([a, b]\), then the solid obtained by rotating the region between \( f(x) \) and \( g(x) \) around the \( x \)-axis has volume
(1) Sketch the region enclosed by the curves and set up an integral to compute its area, but do not evaluate.
   (a) \( y = 4 - x^2, \ y = x^2 - 4 \)
   (b) \( y = x^2 - 6, \ y = 6 - x^3, \ x = 0 \)
   (c) \( y = x\sqrt{x-2}, \ y = -x\sqrt{x-2}, \ x = 4 \)
   (d) \( x = 2y, \ x + 1 = (y - 1)^2 \)
   (e) \( y = \cos x, \ y = \cos(2x), \ x = 0, \ x = \frac{2\pi}{3} \)

(2) Calculate the volume of a cylinder inclined at an angle \( \theta = \frac{\pi}{3} \) with height 10 and base of radius 4.

(3) Calculate the volume of the ramp in the figure below in three ways by integrating the area of the cross sections:
   (a) perpendicular to the \( x \)-axis.
   (b) perpendicular to the \( y \)-axis.
   (c) perpendicular to the \( z \)-axis.

(4) Let \( M \) be the average value of \( f(x) = 2x^2 \) on \([0, 2]\). Find a value \( c \) such that \( f(c) = M \).

(5) Find the flow rate through a tube of radius 2 meters, if its fluid velocity at distance \( r \) meters from the center is \( v(r) = 4 - r^2 \).
(6) Compute the volume of a cone of height 12 whose base is an ellipse with semimajor axis \( a = 6 \) and semiminor axis \( b = 4 \).

(7) Sketch the region enclosed by the curves, and determine the cross section perpendicular to the \( x \)-axis. Set up an integral for the volume of revolution obtained by rotating the region around the \( x \)-axis, but do not evaluate.
   (a) \( y = x^2 + 2, \ y = 10 - x^2 \).
   (b) \( y = 16 - x, \ y = 3x + 12, \ x = -1 \).
   (c) \( y = \frac{1}{2}, \ y = \frac{5}{2} - x \).
   (d) \( y = \sec x, \ y = 0, \ x = -\frac{\pi}{4}, \ x = \frac{\pi}{4} \).

(8) A frustrum of a pyramid is a pyramid with it’s top cut off. Let \( V \) be the volume of a frustrum of height \( h \) whose base is a square of side \( a \) and whose top is a square of side \( b \) with \( a > b > 0 \).

   (a) Show that if the frustrum were continued to a full pyramid (i.e. the top wasn’t cut off), it would have height \( ha/(a - b) \).
   (b) Show that the cross sectional area at height \( x \) is a square of side \( (1/h)(a(h - x) + bx) \).
   (c) Show that \( V = \frac{1}{3}h(a^2 + ab + b^2) \).