

# Math 103X.02 Homework 7 Answers & Solutions

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§5.2: 14.  $\int_0^{1/9} \int_x^3 3y \, dy \, dx + \int_{1/9}^1 \int_x^{1/\sqrt{x}} 3y \, dy \, dx = 1 + \ln 27$ ; 16.  $\int_0^1 \int_x^{3x} (x^2 + y^2) \, dy \, dx + \int_1^{\sqrt{3}} \int_x^{3/x} (x^2 + y^2) \, dy \, dx = 6$ .

§5.3: 12.  $\int_0^1 \int_y^{2-y} \sin x \, dx \, dy = 2 \sin 1 - \sin 2$ ; 16. 2.

§5.4: 16.  $\int_0^2 \int_0^{\sqrt{4-x^2}} \int_{x^2+y^2}^4 3x \, dz \, dy \, dx = 64/5$ ; 20.  $\int_{-a}^a \int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} \int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} dz \, dy \, dx = 16a^3/3$ ;  
24. See official solution (attached).

§1.7: 24.  $z^2 = 2r^2$  (cylindrical) and  $\cos \psi = \pm \sqrt{2/3}$  (spherical); the surface is a cone symmetric about the  $z$  axis, with vertex at the origin; 26. This is a quarter wedge of a cylinder (looks like a quarter wheel of cheese); 34. This is the “ice cream cone” from problem 33 but without the ice cream; it’s a flat topped cone with tip at the origin and top at  $z = 2$ .