

# Calculus II

*Professor Bieri*joanna\_bieri@redlands.edu

---

**SPRING BREAK WORKSHEET:****READ AND PRACTICE**

Read and Review any sections that you are having trouble with. This is your chance to get caught up in the class. Think about specific questions that you have about the material, so we can address them in class when you return from break.

**HAND IN**

1. Find the area of the region enclosed by  $y = e^x$ ,  $y = 1 - x$ , and  $x = 1$
2. Find the total mass of a rod of length 1.2m with linear density  $\rho(x) = (1 + 2x + \frac{2}{9}x^3)$  kg/m.
3. Find the volume obtained by rotating the region bounded by the parabola  $y = x^2$  and the line  $y = mx$  about the axis  $y = -a$ . Where  $m$  and  $a$  are positive numbers with  $m$  representing the slope of the line.
4. Water is pumped INTO a spherical tank of radius 2m from the bottom. The density of water is  $1000 \text{ kg/m}^3$ . How much work is needed to fill the tank to a level of  $h$  meters?
5. A 100 kg anchor is attached to the bottom of a chain whose density is 15 kg/m. How much work is done in raising the chain from being fully extended, 100 meters up to the deck of the boat. (assume buoyancy has no effect)
6. Calculate the arc length of  $y = 3x + 1$  over the interval  $[0, 3]$ . First use integration, then check your answer using the distance formula.
7. Calculate the arc length of  $y = x^{\frac{3}{2}}$  over the interval  $[1, 2]$ .
8. Find the volume of revolution for the region bounded by the line  $y = 4x + 3$  between  $[0, 1]$  and  $y = 0$  rotated about the x-axis.
9. Find the volume created by rotating the region bounded by  $y = x^4$ ,  $y = x$ , and  $x = \frac{1}{2}$  in the first quadrant is rotated about the axis  $x = 0$ .
10. Find the fluid force on the "infinite" plate bounded by the curve  $y = \ln(x)$  for  $0 \leq x \leq 1$ . NOTE: This will result in an improper integral!
11. Find the fluid force on the plate bounded by  $y = x^2$  and  $y = x$ , if the plate is submerged underwater with the water line at  $y = 2$ .

12. Evaluate the following integrals:

(a)

$$\int x(\ln(x))^3 dx$$

(b)

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

use trig identities not formulas, unless you first derive the formula.

(c)

$$\int \frac{dx}{x^2\sqrt{5-x^2}}$$

(d)

$$\int \frac{x}{\sqrt{5-x^2}} dx$$

(e)

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

(f)

$$\int \sin(x) \cos^3(x) dx$$

(g)

$$\int_0^4 \frac{dx}{\sqrt{4-x}}$$

(h)

$$\int_1^\infty \frac{dx}{x^{\frac{19}{20}}}$$