Problem 1. Solve the following indefinite integrals using integration by parts (Hint: Use u-substitution first for the first one). Reminder: Don't forget '+C' if you are solving an indefinite integral!

Problem 2. Evaluate the following integrals using a trigonometric substitution.

1. $\int \frac{1}{\sqrt{x^2+16}} \, dx$

2. $\int_0^a \frac{1}{(a^2+x^2)^{\frac{3}{2}}} \, dx,\ a > 0$

Problem 3. Evaluate the following trigonometric integrals using either a trigonometric substitution or identity.

1. $\int \csc(x)\,dx$

2. Recall the strategy you learned in Lecture 2 to evaluate integrals of the form $\int \sin^m(x)\cos^n(x)\,dx$. This can also be found in the blue boxed text in page 481 of your textbook. Using this strategy, evaluate $\int \sin^3(x)\cos^4(x)\,dx$

3. Recall the strategy you learned in Lecture 2 to evaluate integrals of the form $\int \tan^m(x)\sec^n(x)\,dx$. This can also be found in the blue boxed text in page 482 of your textbook. Using this strategy, evaluate $\int \tan^2(x)\sec^4(x)\,dx$

4. $\int_0^\pi \cos^4(t)\,dt$

Problem 4. Find a formula for the area of an ellipse with the equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. Don't worry about value c in Figure 1. This denotes the location of the focus of the ellipse $(c^2 = a^2 - b^2)$. Hint: Solve for y first! The area, A, should be in terms of a and b, $A = A(a, b)$.

Problem 5. Find the area of the lune shown in Figure 2.

Problem 6. Evaluate the following indefinite integral. There are many steps to this problem.

$$\int x^2 \sqrt{x^2 + 2x + 5} \, dx$$
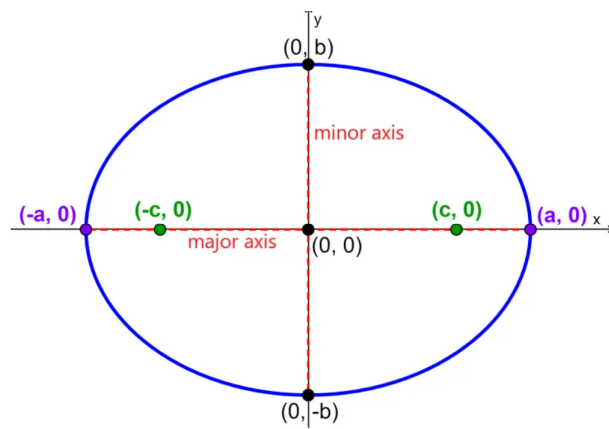
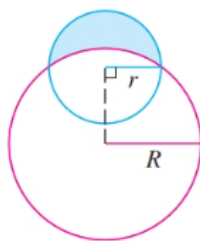# Figures

Problem 4

Figure 1: Graph of Ellipse

Problem 5

Figure 2: Graph of Intersecting Circles Forming Lune