Recitation #10: Trigonometric substitutions - Instructor Notes

Group work:

Problem 1 *Evaluate the following integrals*

(a)
$$\int_{-\frac{5}{3}}^{-\frac{5}{6}} \frac{\sqrt{36x^2-25}}{x^3}\,dx.$$

(b)
$$\int \frac{dx}{\left(x^2-6x+11\right)^2}.$$

(c)
$$\int \frac{x^2}{\sqrt{4x-x^2}}\,dx.$$

(d)
$$\int \frac{e^x}{\sqrt{e^{2x}+9}}\,dx.$$

(e)
$$\int \frac{dx}{x^{\frac{1}{2}}-9x^{\frac{3}{2}}}.$$

Instructor Notes: Each of problems (a) through (c) involves one or more of the major points of trig substitution. Each of the three kinds of substitutions is represented, as well as working with absolute value issues in problem (a) (also could be brought up in problem (c)), completing the square, back substitution (c), and various trigonometric integrals. **Be adamant about substituting for** dx as well as the rest of the integrand. In (a), show the time-saving value of changing the limits in terms of θ.
