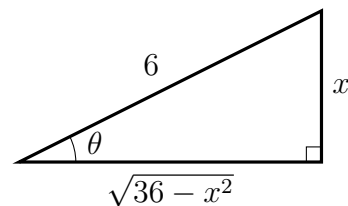**Homework 6 - Math 142**   **Name:** _____

Due by 5:00pm Friday, October 2. Send a PDF with your solutions to `blins@hsc.edu`.

1. Use the reference triangle below to help compute $\displaystyle\int \frac{x}{\sqrt{36-x^2}}\,dx$.

2. Use a trigonometric substitution to find $\displaystyle\int x^3\sqrt{x^2-1}\,dx$.

3. Use partial fractions to evaluate $\displaystyle\int \frac{x+5}{x^2-5x+4}\,dx$.

4. Compute $\displaystyle\int \frac{1}{x^2-9}\,dx$.

5. Evaluate $\displaystyle\int \frac{x^3}{x-4}\,dx$. Hint: Use polynomial long division to simplify first.

6. Compute $\lim\limits_{x \to 2} \dfrac{x^2 + 3x - 10}{x - 2}$.

7. Compute $\lim\limits_{x \to \pi} \dfrac{x - \pi}{\sin x}$.

8. Find $\lim\limits_{x \to 0^+} \left(\dfrac{12}{x} - \dfrac{5}{x^2} \right)$.

9. Find $\lim\limits_{x \to \infty} x^{1/x}$. Hint: Let $A = \lim\limits_{x \to \infty} x^{1/x}$ and take the natural log of both sides.

10. Which function grows faster as $x \to \infty$, $f(x) = \ln(x^2)$ or $g(x) = \sqrt{x}$? Use L'Hospital's rule to find out.