Evaluate the definite integrals and find the indefinite integrals. EXACT ANSWERS ONLY PLEASE!!!

1. $\int_0^5 \sqrt{49 - x^2}\, dx$

2. $\int \frac{\sin^3 3x}{\sqrt{\cos 3x}}\,dx$

3. $\int (x+3)\sqrt{1-x}\,dx$

4. $\int \tan^3\theta \sec^3\theta d\theta$

5. $\int \sin^4 3x dx$

6. $\int \ln 5x dx$

7. $\int_0^1 \frac{x^2 - x}{x^2 + x + 1} dx$

8. $\int_0^2 x^2 e^{-2x} dx$

9. $\int \frac{\sin x}{\cos x + \cos^2 x}\, dx$

10. $\int \frac{xe^{3x}}{(3x+1)^2}\,dx$

Evaluate the following limits. EXACT ANSWERS ONLY PLEASE!!!

1. $\lim_{x\to 0} x^x$

2. $\lim_{x\to 0^+} \sin x \ln x$

3. $\lim_{x\to\infty} \left(x - \ln x\right)$

Find the area of the region bounded by $f(x)=\sqrt{x^2+4}$, $y=0$ $x=1$, and. $x=4$.

$$\sin mx \sin nx = \frac{1}{2}(\cos[(m-n)x] - \cos[(m+n)x])$$

$$\sin mx \cos nx = \frac{1}{2}(\sin[(m-n)x] + \sin[(m+n)x])$$

$$\cos mx \cos nx = \frac{1}{2}(\cos[(m-n)x] + \cos[(m+n)x])$$