BC CALCULUS PRACTICE 8.8 **Name:** _____ **Period** _____

Aisle _____ pg. 576; 1, 3, 9, 15, 23, 29, 39, 41, 45a, 53 (hint: let $x = r\tan\theta$)

Show all necessary work neatly.

1. In each part, determine whether the integral is improper, and if so, explain why.

(a) $\int_1^5 \frac{dx}{x-3}$ (b) $\int_1^5 \frac{dx}{x+3}$ (c) $\int_0^1 \ln x\, dx$

(d) $\int_1^{+\infty} e^{-x}\, dx$ (e) $\int_{-\infty}^{+\infty} \frac{dx}{\sqrt[3]{x-1}}$ (f) $\int_0^{\pi/4} \tan x\, dx$

In Exercises 3–30, evaluate the integrals that converge.

3. $\int_0^{\infty} e^{-2x}\, dx$

9. $\int_{-\infty}^{0} \frac{dx}{(2x-1)^3}$

15. $\int_{-\infty}^{+\infty} \frac{x}{(x^2+3)^2}\, dx$

23. $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \frac{\sin x}{\sqrt{1-2\cos x}}\, dx$

29. $\int_0^{+\infty} \frac{1}{x^2}\, dx$

In Exercises 41 and 42, use L'Hôpital's rule to help evaluate the improper integral.

41. $\int_0^1 \ln x \, dx$

45. Suppose that the region between the x-axis and the curve $y = e^{-x}$ for $x \geq 0$ is revolved about the x-axis.
(a) Find the volume of the solid that is generated.

53. In electromagnetic theory, the magnetic potential at a point on the axis of a circular coil is given by

$$u = \frac{2\pi NIr}{k} \int_a^{+\infty} \frac{dx}{(r^2 + x^2)^{3/2}}$$

where N, I, r, k, and a are constants. Find u.

(hint: let $x = r \tan \theta$)