MATH 155 **Name**

Chapter 8 Practice Test

Use Algebraic Notation AND Show All of Your Work

Evaluate each integral. If you use a **substitution and/or change of variable technique**, be sure to state $u =$, $\frac{du}{dx} =$, and $dx =$ in each process. *(Be careful with your notation, and show your integration steps clearly.)*

1. Integrate: $\int \frac{1}{\cos(\theta)-1} d\theta$

$$\int \frac{1}{\cos(\theta)-1} d\theta =$$

2. Integrate: $\int e^x \cos(x)\,dx$

$\int e^x \cos(x)\,dx =$

3. Integrate: $\int_{0}^{\frac{\pi}{4}} e^{-x}\cos(x)dx$

$\int_{0}^{\frac{\pi}{4}} e^{-x}\cos(x)dx =$

4. Integrate: $\int \cos(2x)\cos(3x)\,dx$

$\int \cos(2x)\cos(3x)\,dx =$ ______________________________

5. Integrate: $\int \sin^2(x)\cos^2(x)dx$

$\int \sin^2(x)\cos^2(x)dx =$ ______

6. Integrate: $\int_0^3 \frac{x^3}{\sqrt{x^2+9}}dx$

$\int_0^3 \frac{x^3}{\sqrt{x^2+9}}dx =$

7. Integrate: $\int \frac{\sqrt{x^2 - 4}}{x} dx$

$\int \frac{\sqrt{x^2 - 4}}{x} dx =$ ______________________________

8. Evaluate the integral: $\int \frac{x^3 - x + 3}{x^2 + x - 2} dx$

$\int \frac{x^3 - x + 3}{x^2 + x - 2} dx =$

9. Evaluate the integral: $\int \frac{2x-3}{(x-1)^2}dx$

$\int \frac{2x-3}{(x-1)^2}dx =$ ______

<u>For #10 and #11</u>: (a) Describe the type of indeterminate form that is obtained by **initial** direct substitution. **(b)** Use "L'Hôpital's Rule" to evaluate the limit. **(c)** Use a graphing utility to graph the original function in the limit over an appropriate interval and verify your result.

10. $\lim_{x \to 1} \frac{\ln(x)}{x-1} =$

(c) $y = \frac{\ln(x)}{x-1}$

$\lim_{x \to 1} \frac{\ln(x)}{x-1} =$

(a) Initial Indeterminate form =

11. $\lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x =$

(c) $y = \left(1 + \frac{1}{x}\right)^x$

$\lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x =$

(a) Initial Indeterminate form =

<u>For #12 and #13:</u> **(a)** Explain **why** the integral is, or is not improper. **(b)** Evaluate the integral. **(c)** Determine whether or not it converges or diverges. **(d)** Use a graphing utility to graph the integrand as a function over the appropriate interval, ***shading the relevant area***, and verify your result.

12. $\int_0^{\infty} xe^{\frac{-x^2}{2}}\,dx =$

(d) $y = xe^{\frac{-x^2}{2}}$ over $[0,\infty)$

(a) Improper, or Not Improper $\Leftrightarrow$

$\int_0^{\infty} xe^{\frac{-x^2}{2}}\,dx =$

(c) Converges, or Diverges

13. $\displaystyle\int_0^6 \frac{4}{\sqrt{6-x}}dx =$

(d) $y = \dfrac{4}{\sqrt{6-x}}$ over $[0,6)$

(a) Improper, or Not Improper ⇔

$\displaystyle\int_0^6 \frac{4}{\sqrt{6-x}}dx =$

(c) Converges, or Diverges

14. Evaluate the integral: $\int \sec^6(3x)dx$

$\int \sec^6(3x)dx =$

15. Evaluate the integral: $\int \tan^6(x)dx$

$\int \tan^6(x)dx =$

16. Evaluate the integral: $\int \tan^3\left(\frac{\pi x}{2}\right)\sec^2\left(\frac{\pi x}{2}\right)dx$

$\int \tan^3\left(\frac{\pi x}{2}\right)\sec^2\left(\frac{\pi x}{2}\right)dx =$ ________________________

17. Evaluate the integral: $\int \frac{\tan^2(x)}{\sec^5(x)} dx$

$\int \frac{\tan^2(x)}{\sec^5(x)} dx =$

18. Evaluate the integral: $\int \sin(-4x)\cos(3x)\, dx$

$\int \sin(-4x)\cos(3x)\, dx =$ ____________________