Notes **Name** _____

L'Hospital's Rule and the Trapezoidal Rule (4.4)

L'Hospital's Rule: Find the limit using L'Hospital's Rule.

1. $\lim_{x\to -2} \frac{x+2}{x^3+8} = \frac{0}{0}$

$\lim_{x\to -2} \frac{1}{3x^2} = \frac{1}{12}$

2. $\lim_{\theta\to \pi/2} \frac{1-\sin\theta}{\csc\theta} = \frac{1-1}{1} =$

0

3. $\lim_{x\to 1} \frac{\ln x}{\sin \pi x} = \frac{0}{0}$

$\lim_{x\to 1} \frac{\frac{1}{x}}{\pi\cos \pi x} = \frac{1}{-\pi} = -\frac{1}{\pi}$

4. $\lim_{x\to \infty} \frac{e^x}{x^2}$

$\lim_{x\to \infty} \frac{e^x}{2x}$

$\lim_{x\to \infty} \frac{e^x}{2} = \infty$

5. $\lim_{x\to \infty} \frac{\ln x}{\sqrt[3]{x}}$

$\lim_{x\to \infty} \frac{\frac{1}{x}}{\frac{1}{3}x^{-2/3}} = \frac{3x^{2/3}}{x}$

$\lim_{x\to \infty} \frac{2x^{-1/3}}{1} = \frac{2}{\sqrt[3]{x}} = 0$

6. $\lim_{x\to \pi^-} \frac{\sin x}{1-\cos x} = \frac{0}{1+1} = 0$

Trapezoidal Rule: Find an approximation of the integral using the Trapezoidal Rule.

7. $\int_1^2 \frac{1}{x}dx, \quad n=5$

$A_T = \frac{1}{2}(b_1+b_2)h$

$h = \frac{2-1}{5} = \frac{1}{5}$ $\quad b_n = f(1), f(1.2), \ldots f(2)$

$$\frac{1}{2}\left(\frac{1}{5}\right)\left[\left(f(1)+f(1.2)\right)+\left(f(1.2)+f(1.4)\right)+\cdots+\left(f(1.8)+f(2)\right)\right]$$

$$\frac{1}{10}\left[\left(1+\frac{5}{6}\right)+\left(\frac{5}{6}+\frac{5}{7}\right)+\left(\frac{5}{7}+\frac{5}{8}\right)+\left(\frac{5}{8}+\frac{5}{9}\right)+\left(\frac{5}{9}+\frac{1}{2}\right)\right]$$

$$\frac{1}{10}\left(\frac{11}{6}+\frac{65}{42}+\frac{75}{56}+\frac{85}{72}+\frac{19}{18}\right) = 0.6956$$

8. $\int_0^9 f(x)dx$

X	0	2	3	7	9
f(x)	3	6	7	6	8