Name _____   Date _____   Period ___ Score _____
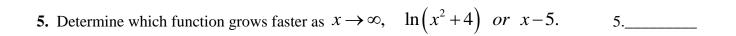
Calculus   Chapter 9 PracticeExam

1. Use L'Hôpital's rule to evaluate $\lim\limits_{x \to 2} \dfrac{x^3 - 2x^2 + x - 2}{x^2 + x - 6}$ 1. _____

2. Find $\lim\limits_{x \to \infty} \dfrac{7x^2 - 8x + 3}{4x^2 + 5}$ 2. _____

3. Use L'Hôpital's rule to find the exact value of $\lim\limits_{x \to 0} \left(e^{\frac{5}{x}} - 3x \right)^{\frac{x}{2}}$ 3. _____

4. A student attempted to use L'Hôpital's rule as follows. Identify the student's error, if any, or state "No error."

$$\lim\limits_{x \to \infty} \dfrac{\sin\left(\dfrac{1}{x}\right)}{\dfrac{1}{e^x}} = \lim\limits_{x \to \infty} \dfrac{-x^{-2}\cos\left(\dfrac{1}{x}\right)}{-x^{-2}e^x} = \lim\limits_{x \to \infty} \dfrac{\cos\left(\dfrac{1}{x}\right)}{\dfrac{1}{e^x}} = \dfrac{1}{1} = 1$$ 4. _____

5. Determine which function grows faster as $x \to \infty$, $\ln(x^2 + 4)$ *or* $x - 5$.　　　5.＿＿＿＿＿＿

6. Show that $f_1(x) = 5^x$, $f_2(x) = 5^{x-3}$, *and* $f_3(x) = 5^x + 3^x$ all grow at the same rate as $x \to \infty$.

7. Order the functions e^{2x}, x^6, $3x^5$, and $(\ln x)^2$ from slowest-growing to fastest growing as $x \to \infty$.

8. Use Partial fractions to evaluate $\displaystyle\int \frac{4x + 30}{x^2 + x - 12} \, dx$　　　　　8.＿＿＿＿＿＿＿

9. Use integration or the comparison test to determine whether the following integrals converge or diverge.

9. (a)_____

(a) $\displaystyle\int_0^\infty x^{-3}dx$

9. (b)_____

9. (c) _____

(b) $\displaystyle\int_0^\infty (5+\cos(x))e^{-x}\ dx$

(c) $\displaystyle\int_0^2 \frac{dx}{4-x^2}$

10. Evaluate $\int_0^3 \dfrac{x}{\sqrt{9-x^2}}\, dx$ or state that it diverges

10. _____

11. Evaluate $\int_e^{\infty} \dfrac{3}{x(\ln x)^2}\, dx$ or state that it diverges

11. _____

12. Find the area of the region in the first quadrant that lies

12. _____

under the graph of $y = (3x^2 + x)e^{-x}$