Supplemental Exercises

Directions: Find the limit. Be careful! L'Hopital's rule is not always needed and may not (directly) apply!

Note: Clicking on **WA** will take you to Wolfram Alpha's solution. Clicking on **Sy** will take you to Symbolab's solution. While Symbolab will show step-by-step solutions, it cannot solve all of these problems (at least at the time of the writing of this handout).

1. $\lim_{x\to 3} \dfrac{x-3}{3x^2-13x+12}$ **WA** **Sy**
2. $\lim_{x\to 0} \dfrac{2\cosh(x)-2}{1-\cos(2x)}$ **WA** **Sy**
3. $\lim_{x\to 0} \dfrac{x-\arctan(x)}{x^3}$ **WA** **Sy**
4. $\lim_{x\to 0} \dfrac{x+\tan(x)}{\sin(x)}$ **WA** **Sy**
5. $\lim_{t\to 0} \dfrac{5^t-3^t}{t}$ **WA** **Sy**
6. $\lim_{x\to 1} \dfrac{\ln(x)}{x-1}$ **WA** **Sy**
7. $\lim_{x\to \infty} \dfrac{\ln(x)}{\sqrt[3]{x}}$ **WA** **Sy**
8. $\lim_{t\to 0} \dfrac{\sin(6x)}{\sinh(2x)}$ **WA** **Sy**
9. $\lim_{x\to 0} \dfrac{e^x-1-x-x^2/2}{x^3}$ **WA** **Sy**
10. $\lim_{x\to 0} \dfrac{\arcsin(x)}{x}$ **WA** **Sy**
11. $\lim_{x\to 0} \dfrac{1-e^{2x}}{\sec(x)}$ **WA** **Sy**
12. $\lim_{x\to 2} \dfrac{\ln(5x-9)}{x^3-8}$ **WA** **Sy**
13. $\lim_{x\to 1} \dfrac{\ln(x)}{\tan(\pi x)}$ **WA** **Sy**
14. $\lim_{x\to -\infty} x^2e^x$ **WA** **Sy**
15. $\lim_{x\to 0^+} \sin(x)\ln(x)$ **WA** **Sy**
16. $\lim_{x\to \infty} x-\ln(x)$ **WA** **Sy**
17. $\lim_{x\to \infty} x^{1/x}$ **WA** **Sy**
18. $\lim_{x\to 0^+} x^{1/x}$ **WA** **Sy**
19. $\lim_{x\to 0^+} (\cos(x))^{1/x^2}$ **WA** **Sy**
20. $\lim_{x\to 0} (1+x)^{1/x}$ **WA** **Sy**
21. $\lim_{x\to 0^+} x^{\sin(x)}$ **WA** **Sy**
22. $\lim_{x\to (\pi/2)^-} (\tan(x))^{\cos(x)}$ **WA** **Sy**
23. $\lim_{x\to \infty} (\ln(x))^{1/x}$ **WA** **Sy**
24. $\lim_{x\to \infty} (3^x+5^x)^{1/x}$ **WA** **Sy**

Answers:

1. $\lim_{x\to 3} \dfrac{x-3}{3x^2-13x+12} = 1/5$
2. $\lim_{x\to 0} \dfrac{2\cosh(x)-2}{1-\cos(2x)} = 1/2$
3. $\lim_{x\to 0} \dfrac{x-\arctan(x)}{x^3} = 1/3$
4. $\lim_{x\to 0} \dfrac{x+\tan(x)}{\sin(x)} = 2$
5. $\lim_{t\to 0} \dfrac{5^t-3^t}{t} = \ln(5/3)$
6. $\lim_{x\to 1} \dfrac{\ln(x)}{x-1} = 1$
7. $\lim_{x\to \infty} \dfrac{\ln(x)}{\sqrt[3]{x}} = 0$
8. $\lim_{t\to 0} \dfrac{\sin(6x)}{\sinh(2x)} = 3$
9. $\lim_{x\to 0} \dfrac{e^x-1-x-x^2/2}{x^3} = 1/6$
10. $\lim_{x\to 0} \dfrac{\arcsin(x)}{x} = 1$
11. $\lim_{x\to 0} \dfrac{1-e^{2x}}{\sec(x)} = 0$
12. $\lim_{x\to 2} \dfrac{\ln(5x-9)}{x^3-8} = 5/12$
13. $\lim_{x\to 1} \dfrac{\ln(x)}{\tan(\pi x)} = 1/\pi$
14. $\lim_{x\to -\infty} x^2e^x = 0$
15. $\lim_{x\to 0^+} \sin(x)\ln(x) = 0$
16. $\lim_{x\to \infty} x-\ln(x) = \infty$
17. $\lim_{x\to \infty} x^{1/x} = 1$
18. $\lim_{x\to 0^+} x^{1/x} = 0$
19. $\lim_{x\to 0^+} (\cos(x))^{1/x^2} = 1/\sqrt{e}$
20. $\lim_{x\to 0} (1+x)^{1/x} = e$
21. $\lim_{x\to 0^+} x^{\sin(x)} = 1$
22. $\lim_{x\to (\pi/2)^-} (\tan(x))^{\cos(x)} = 1$
23. $\lim_{x\to \infty} (\ln(x))^{1/x} = 1$
24. $\lim_{x\to \infty} (3^x+5^x)^{1/x} = 5$