Limits and L'Hospital's Rule

For more problems see Stewart §4.4

1. $\lim_{x\to 0} \dfrac{x\sin(x)}{x^2+\cos(x)}$
2. $\lim_{x\to \frac{\pi}{2}^+} \dfrac{\tan(x)}{\ln(2x-\pi)}$
3. $\lim_{x\to 0} \sin(x)^{\tan(x)}$
4. $\lim_{x\to -\infty} \dfrac{\pi x}{2} + x\arctan(x)$
5. $\lim_{x\to 0} \dfrac{\arcsin(x)}{x^2\csc(x)}$
6. $\lim_{x\to \pi} \dfrac{\sqrt{1-\tan(x)}-\sqrt{1+\tan(x)}}{\sin(2x)}$
7. $\lim_{x\to \infty} x^2\sin(\pi/x)$
8. $\lim_{x\to \infty} \dfrac{9x}{\ln(x+e^{10x})}$
9. $\lim_{x\to 2} \dfrac{x^3-8}{32-x^5}$
10. $\lim_{x\to 1} \dfrac{1}{x-1} - \dfrac{1}{\ln(x)}$
11. $\lim_{x\to 1} \dfrac{\arccos(x)}{\sqrt{1-x}}$
12. $\lim_{x\to \pi/2} (1-2\cos(x))^{\sec(3x)}$
13. $\lim_{x\to \pi} \dfrac{\sin^2(x)}{1+\cos(3x)}$
14. $\lim_{x\to \infty} (e^x+x)^{2/x}$

Answers

1. 0 (No HR)
2. ∞
3. 1
4. -1
5. 1
6. $-\dfrac{1}{2}$
7. ∞
8. $\dfrac{9}{10}$
9. $-\dfrac{3}{20}$
10. $-\dfrac{1}{2}$
11. $\sqrt{2}$
12. $e^{2/3}$
13. $\dfrac{-2}{9}$
14. e^2