

Math 2143 - Brief Calculus with Applications

Quiz #11 - 2008.03.13

Solutions

1. Compute the following limit.

$$\begin{aligned}\lim_{x \rightarrow 2} \frac{\sqrt{x+2} - \sqrt{2x}}{x^2 - 2x} &= \lim_{x \rightarrow 2} \frac{\sqrt{x+2} - \sqrt{2x}}{x^2 - 2x} \cdot \frac{\sqrt{x+2} + \sqrt{2x}}{\sqrt{x+2} + \sqrt{2x}} \\ &= \lim_{x \rightarrow 2} \frac{x+2-2x}{(x^2-2x)(\sqrt{x+2} + \sqrt{2x})} \\ &= \lim_{x \rightarrow 2} \frac{2-x}{(x^2-2x)(\sqrt{x+2} + \sqrt{2x})} \\ &= \lim_{x \rightarrow 2} \frac{-(x-2)}{x(x-2)(\sqrt{x+2} + \sqrt{2x})} \\ &= \lim_{x \rightarrow 2} \frac{-1}{x(\sqrt{x+2} + \sqrt{2x})} \\ &= \frac{-1}{2(2+2)} \\ &= -\frac{1}{8}\end{aligned}$$

2. Compute the following derivative.

$$\begin{aligned}\frac{d}{ds} \left(s^2 + \frac{1-s}{1+s^2} \right)^3 &= 3 \left(s^2 + \frac{1-s}{1+s^2} \right)^2 \frac{d}{ds} \left(s^2 + \frac{1-s}{1+s^2} \right) \\ &= 3 \left(s^2 + \frac{1-s}{1+s^2} \right)^2 \left[2s + \frac{-1 \cdot (1+s^2) - (1-s) \cdot 2s}{(1+s^2)^2} \right]\end{aligned}$$