

Math 2215 - Calculus 1

Quiz #12 - 2005.11.11

Solutions

1. Compute the following limit:

$$\lim_{x \rightarrow 0} \frac{\tan(px)}{\tan(qx)}$$

Notice that this is in the *indeterminant form of type* $\frac{0}{0}$. Taking a derivative of the numerator and denominator gives

$$\lim_{x \rightarrow 0} \frac{\tan(px)}{\tan(qx)} = \lim_{x \rightarrow 0} \frac{p \sec^2(px)}{q \sec^2(qx)} = \lim_{x \rightarrow 0} \frac{p \cos^2(qx)}{q \cos^2(px)} = \frac{p}{q}$$

2. Find an equation of the slant asymptote for the following function:

$$y = \frac{2x^3 + x^2 + x + 3}{x^2 + 2x}$$

Dividing both top and bottom by x^2 gives

$$y \approx 2x + 1 \text{ as } x \rightarrow \pm\infty.$$

3. Compute the following limit:

$$\begin{aligned} & \lim_{x \rightarrow 1} \frac{2x^3 + 4x^2 - 6x}{x - 1} \\ &= \lim_{x \rightarrow 1} \frac{2x(x - 1)(x + 3)}{x - 1} \\ &= \lim_{x \rightarrow 1} 2x(x + 3) = 8 \end{aligned}$$