Math 152 Name_____KEY_____
Quiz 1

1. Differentiate each function.

   (a) $f(x) = xe^{(x^2)}$

$$\begin{aligned} f'(x) &= e^{(x^2)} + xe^{(x^2)}(2x) \\ &= e^{(x^2)} + 2x^2e^{(x^2)} \end{aligned}$$

   (b) $y = (e^x + x)^3$

$$\frac{dy}{dx} = 3(e^x + x)^2(e^x + 1)$$

2. Find the indicated limit. If you determine that a limit does not exist, you must describe it as either $+\infty$ or $-\infty$ if one of these labels applies.

   (a) $\lim_{x\to\infty} \frac{e^x}{x^2}$

$$\lim_{x\to\infty} \frac{e^x}{x^2} \overset{\checkmark}{=} \lim_{x\to\infty} \frac{e^x}{2x} \overset{\checkmark}{=} \lim_{x\to\infty} \frac{e^x}{2} = \infty$$

   (b) $\lim_{x\to 0} \frac{x\sin x}{\cos x - 1}$

$$\lim_{x\to 0} \frac{x\sin x}{\cos x - 1} \overset{\checkmark}{=} \lim_{x\to 0} \frac{x\cos x + \sin x}{-\sin x} \overset{\checkmark}{=} \lim_{x\to 0} \frac{-x\sin x + \cos x + \cos x}{-\sin x} = \frac{2}{-1} = -2$$

3. Give the exact value of each quantity.

   (a) $\sin \frac{\pi}{3}$

$$\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$$

(b) $\cos \frac{3\pi}{4}$

$$\cos \frac{3\pi}{4} = -\frac{\sqrt{2}}{2}$$

(c) $\tan \frac{\pi}{6}$

$$\tan \frac{\pi}{6} = \frac{\sin \frac{\pi}{6}}{\cos \frac{\pi}{6}} = \frac{\left(\frac{1}{2}\right)}{\left(\frac{\sqrt{3}}{2}\right)} = \frac{1}{\sqrt{3}}$$