1J. Trigonometric functions

1a)

$$\frac{d}{dx}\sin(5x^2) = \boxed{\cos(5x^2)\cdot 10x}$$

1e)

$$\frac{d}{dx}\frac{\sin(x)}{x} = \frac{\cos(x)\cdot 1\cdot x - \sin(x)}{x^2} = \boxed{\frac{x\cos(x)-\sin(x)}{x^2}}$$

1h)

$$\frac{d}{dx}\tan^2(3x) = 2\tan(3x)\sec^2(3x)\cdot 3 = \boxed{6\sec^2(3x)\tan(3x)}$$

1m)

$$\cos(2x) = \cos^2(x) - \sin^2(x) \neq 2\cos^2(x)$$

$$= 2\cos^2(x) - 1$$

I graphed them to verify

2)

$$\lim_{x\to\frac{\pi}{2}} \frac{\cos(x)}{x-\frac{\pi}{2}} = -1$$