

1) Find  $T_2$  for  $f(x) = \arctan(x)$  about  $x = 1$ .

$$T_2 = f(a) + f'(a)(x-a) + \frac{f''(a)}{2!} (x-a)^2$$

$$f'(x) = \frac{1}{1+x^2}$$

$$f'(1) = \frac{1}{2}$$

$$f''(x) = \frac{-2x}{1+x^2}$$

$$f''(1) = \frac{-2}{2} = -1$$

$$f(1) = \arctan(1) = \frac{\pi}{4}$$

$$T_2 = \frac{\pi}{4} + \frac{1}{2}(x-1) - \frac{1}{2!}(x-1)^2$$