

# AH Weekly HW 1

1. a)  $y = x \tan^{-1} 2x$  for product rule

$$\frac{dy}{dx} = \tan^{-1} 2x + \frac{2x}{1+4x^2}$$

$u = x \quad \frac{du}{dx} = 1$        $v = \tan^{-1} 2x \quad \frac{dv}{dx} = \frac{1}{1+(2x)^2} \cdot 2 = \frac{2}{1+4x^2}$  (3)

b)  $f(x) = \frac{1-x^2}{1+4x^2}$

$$f'(x) = \frac{-2x(1+4x^2) - 8x(1-x^2)}{(1+4x^2)^2}$$
$$= \frac{-2x - 8x^3 - 8x + 8x^3}{(1+4x^2)^2}$$
$$= \frac{-10x}{(1+4x^2)^2}$$

$u = 1-x^2 \quad \frac{du}{dx} = -2x$        $v = 1+4x^2 \quad \frac{dv}{dx} = 8x$  (3)

10.  $e^y = \frac{(3x+2)e^{2x}}{(2x-1)^2}$

$$\ln e^y = \ln(3x+2) + \ln e^{2x} - \ln(2x-1)^2$$

$$y = \ln(3x+2) + 2x \ln e - 2 \ln(2x-1)$$

$$y = \ln(3x+2) + 2x - 2 \ln(2x-1)$$

$$\frac{dy}{dx} = \frac{1}{3x+2} \cdot 3 + 2 - 2 \cdot \frac{1}{2x-1} \cdot 2$$

$$= \frac{3}{3x+2} + 2 - \frac{4}{2x-1}$$
 (3)