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Petroleum Engineering  
19 Eng 07 / 013  
Math 104 assignment  
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#### Question 4

A) given that  $f(x) = 2x^3 - 7x$  and  $g(x) = -3x$

Find  $(f-g)(5)$

$$\begin{aligned}(f-g)(5) &= (2x^3 - 7x - (-3x))(5) \\ &= (2x^3 - 7x + 3x)(5) \\ &= (2x^3 - 4x)(5) \\ &= \cancel{10x^3} - 4x \\ &= 10x^3 - 20x //\end{aligned}$$

#### Question 5

5) Find  $F \circ g(x)$ ,  $F(x) = 4x^2 + 2$  and  $g(x) = 2x + 3$

$$\begin{aligned}F \circ g(x) &= 4(2x+3)^2 + 2 \\ &= 4(4x^2 + 12x + 9) + 2 \\ &= 16x^2 + 48x + 36 + 2 \\ &= 16x^2 + 48x + 38\end{aligned}$$

question 6

6) Find the gradient of  $x^2 + 2xy + y^2 = 1020$

solo

$$x^2 + 2xy + y^2 = 1020$$

$$2x \frac{dy}{dx} + 2 \left[ x \frac{dy}{dx} + y \frac{dx}{dx} \right] + 2y \frac{dy}{dx} = 0$$

$$2x + 2x \frac{dy}{dx} + 2y + 2y \frac{dy}{dx} = 0$$

∴ divide through by 2

$$\frac{0x}{2} + \frac{2x}{2} \frac{dy}{dx} + \frac{2y}{2} + \frac{2y}{2} \frac{dy}{dx} = 0$$

$$0x + x \frac{dy}{dx} + y + y \frac{dy}{dx} = 0$$

$$x \frac{dy}{dx} + y \frac{dy}{dx} = -x - y$$

$$\frac{dy}{dx} (x + y) = \frac{-x - y}{(x + y)}$$

$$\frac{dy}{dx} = \frac{-(x + y)}{(x + y)}$$

$$\frac{dy}{dx} = -1$$

question 7

7)  $2x^2 \cos x$  find  $\frac{dy}{dx}$

$$u = 2x^2 \quad v = \cos x$$

$$\frac{du}{dx} = 2x \quad \frac{dv}{dx} = -\sin x$$

$$\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$\frac{dy}{dx} = 2x \cos x (-\sin x) + \cos x (2x)$$

$$\frac{dy}{dx} = 2 \cos x (-\sin x) - \sin x (2x)$$

$$\frac{dy}{dx} = -2 \cos x \sin x - 2x \sin x$$