MA4702 - Revision of Differentiations

Revision of Differentiation in advance of the "Curve Sketching" component of course. Please note that short questions on differentation should be expected for the second midterm

1. $f(x) = x^2$
2. $f(x) = 2x + 2$
3. $f(x) = \frac{1}{2}x^2$
4. $f(x) = 2x^2 + 4x + 4$
5. $f(x) = \sqrt{x+2}$
6. $$f(x) = \frac{1}{x}$$
7. $$f(x) = \frac{3}{x+1}$$
8. $$f(x) = \frac{1}{\sqrt{x+1}}$$
9. $$f(x) = \frac{x}{x+2}$$

Selected Solutions

1. $2x$
2. 2
3. x
4. $4x + 4$
5. $$\frac{1}{2\sqrt{x+2}}$$
6. $$-\frac{1}{x^2}$$
7. $$\frac{-3}{(x+1)^2}$$
8. $$\frac{-1}{2(x+1)^{3/2}}$$
9. $$\frac{2}{(x+2)^2}$$

Question 1A : Revision of Differentiations

1 $f(x) = x^2$

2 $f(x) = 2x + 2$

3 $f(x) = \frac{1}{2}x^2$

4 $f(x) = 2x^2 + 4x + 4$

5 $f(x) = \sqrt{x+2}$

6 $f(x) = \frac{1}{x}$

7 $f(x) = \frac{3}{x+1}$

8 $f(x) = \frac{1}{\sqrt{x+1}}$

9 $f(x) = \frac{x}{x+2}$

Question 1B : Using the Power Rule

10 $f(x) = x^5 + x^3$

11 $f(x) = 2x^2 + 4$

12 $f(x) = 3\sqrt[3]{x}$

13 $f(x) = 2x^5 + 8x^2 + x - 78$

14 $f(x) = 7x^7 + 8x^5 + x^3 + x^2 - x$

15 $f(x) = \frac{1}{x^2} + 3x^{\frac{1}{3}}$

16 $f(x) = 3x^{15} + \frac{1}{17}x^2 + \frac{2}{\sqrt{x}}$

17 $f(x) = \frac{3}{x^4} - \sqrt[4]{x} + x$

18 $f(x) = 6x^{1/3} - x^{0]4} + \frac{9}{x^2}$

19 $f(x) = \frac{1}{\sqrt[3]{x}} + \sqrt{x}$

Question 1C : Using the Product Rule

20 $f(x) = (x^4 + 4x + 2)(2x + 3)$

21 $f(x) = (2x - 1)(3x^2 + 2)$

22 $f(x) = (x^3 - 12x)(3x^2 + 2x)$

23 $f(x) = (2x^5 - x)(3x + 1)$

Question 1D : Using the Quotient Rule

24 $f(x) = \frac{2x+1}{x+5}$

25 $f(x) = \frac{3x^4+2x+2}{3x^2+1}$

26 $f(x) = \frac{x^{\frac{3}{2}}+1}{x+2}$

27 $f(u) = \frac{u^3+2}{u^3}$

28 $f(x) = \frac{x^2+x}{2x-1}$

29 $g(x) = \frac{x+1}{2x^2+2x+3}$

30 $h(x) = \frac{16x^4+2x^2}{x}$

Question 1E : Using the Chain Rule

31 $f(x) = (x+5)^2$

32 $f(x) = (x^3 - 2x + 5)^2$

33 $f(x) = \sqrt{1-x^2}$

34 $f(x) = \frac{(2x+4)^3}{4x^3+1}$

35 $f(x) = (2x+1)\sqrt{2x+2}$

36 $f(x) = \frac{2x+1}{\sqrt{2x+2}}$

37 $f(x) = \sqrt{2x^2+1}(3x^4+2x)^2$

38 $f(x) = \frac{2x+3}{(x^4+4x+2)^2}$

39 $f(x) = \sqrt{x^3+1}(x^2-1)$

Question 1F : Differentiation of Exponentials

40 $f(x) = ((2x+3)^4+4(2x+3)+2)^2$

41 $f(x) = \sqrt{1+x^2}$

42 $f(x) = (3x^2+e)e^{2x}$

43 $f(x) = e^{2x^2+3x}$

44 $f(x) = e^{e^{2x^2+1}}$

45 $f(x) = 4^x$

Question 1G : Logarithms

46 $f(x) = 2^{x-3} \cdot 3\sqrt{x^3-2} + \ln x$

47 $f(x) = \ln x - 2e^x + \sqrt{x}$

48 $f(x) = \ln(\ln(x^3(x+1)))$

49 $f(x) = \ln(2x^2+3x)$

50 $f(x) = \log_4 x + 2\ln x$

Question 1H : Trigonometric functions

51 $f(x) = \sin(x) + \cos(x)$

52 $f(x) = \sin(4x)$

53 $f(x) = \cos(4x)$

54 $f(x) = \sin(3x) + \cos(5x)$