1 | **Problem 1**

Differentiate (with respect to x)

1.1 | (a)

$$y = x^2 + x^{74} - \ln x - \log_3 x + 51^x - e^x + \sin x - \cos x$$
$$\frac{d}{dx}[y] = 2x + 74x^{73} - \frac{1}{x} - \frac{1}{x\ln(3)} + ln(51) * 51^x - e^x + \cos x + \sin x$$

1.2 | (b)

$$g(x) = x^{32} - 7x^{12} + x^{-8} - e^x + 12\sqrt[7]{x+1} + (\cos x)^6$$
$$\frac{d}{dx}[g(x)] = 32x^{31} - 84x^{11} - 8x^{-7} - e^x + \frac{12}{7\sqrt[7]{(x+1)^6}} - 6\sin x \cos x^5$$

1.3 | (c)

$$f(x) = 7 + x^2 + 6x^3 + 3\sqrt[4]{x} + \frac{1}{x} - \ln x + 5^x$$
$$\frac{d}{dx}[f(x)] = 2x + 18x^2 + \frac{3}{4\sqrt[4]{x^3}} - \frac{1}{x} + \ln(5)5^x$$

1.4 | (d)

$$f(x) = 3x(x^2+1)^3 + \cos(\sin x) + \frac{x^9 + x^4}{2x+5}$$
$$\frac{d}{dx}[f(x)] = 3(x^2+1)^3 + 18x^2(x^2+1)^2 + -\cos(x)\sin(\sin x) + \frac{45x^8 + 6x^4 + 10x^3}{4x^4 + 10x + 25}$$

1.5 | (e)