MAT 131 sample problems for test 3

The following problems are a bit challenging, this is not homework.

1.Find the local and global extreme values of function on the given interval.

1)

$$f(x) = x^3 - 6x^2 + 8x + 3, x \in [2, 4]$$

2)

$$f(x) = \frac{x}{x^2 + 1}, x \in [-3, 2]$$

3)

$$f(x) = \frac{\ln x}{x^2}, x \in [1, 3]$$

4)

$$f(x) = x + \frac{1}{x}, x \in (0, +\infty)$$

2.Find the limit.

1)

$$\lim_{x \to 0} \frac{1 - \cos x}{x^2 + 3x^3}$$

2)

$$\lim_{x \to 0} \frac{\sin x}{\tan 2x}$$

3)

$$\lim_{x \to +\infty} x^4 e^{-x}$$

4)

$$\lim_{x \to 0} x^2 \ln x$$

5)

$$\lim_{x \to 0} (1 - \sin x)^{\frac{1}{x}}$$

3. Find $f(x)$

1)

$$f'(t) = 2t - \sin t, f(0) = 3$$

2)

$$f''(t) = 1 - 2t, f(0) = 0, f(1) = \frac{7}{6}$$