CSD1251/CSD1250 Homework 3

Due: 31st January 2023, 2359 HRS

For each question, key in **the** correct option into the homework into the "Homework 3" option in the "15 January to 21 January" section in our meta course page on Moodle. **Starred(*) questions are slightly more difficult.**

Question 1

Evaluate the limit

$$\lim_{x\to 2} \frac{x^2+3x+2}{x^3+6x}.$$

(a) $\frac{3}{8}$ (b) 0 (c) $\frac{3}{5}$ (d) $\frac{1}{4}$ (e) None of the above

Question 2

Evaluate the limit

$$\lim_{x\to -2} \frac{x^2+4x+4}{x^2+2x}.$$

(a) 2 (b) 0 (c) $\frac{3}{8}$ (d) $\frac{1}{2}$ (e) None of the above

Question 3

Evaluate the limit

$$\lim_{x\to 11} \frac{\sqrt{x-7}-2}{x^2-12x+11}.$$

(a) 1 (b) 0 (c) $\frac{1}{10}$ (d) $\frac{1}{4}$ (e) None of the above

Question 4

Let $f(x) = \dfrac{3x^4}{x^2 + 4x}$. Find $f'(1)$.

(a) $\dfrac{42}{25}$ (b) 3 (c) $\dfrac{42}{5}$ (d) $\dfrac{3}{5}$ (e) None of the above

Question 5

Let $f(x) = x^2 \sin x$. Find $f'(x)$.

(a) $2x \cos x$ (b) $x^2 \cos x$ (c) $x(x \cos x + 2 \sin x)$
(d) $x(2 \sin x - x \cos x)$ (e) None of the above

Question 6

The following limit is the definition of the derivative of some function f, at a point $a = 1$.

$$\lim_{y \to 0} \frac{e^{y+1} - e}{y}$$

Find the function f.

(a) $\ln x$ (b) e^x (c) e^{x+1} (d) $\ln(x + 1)$ (e) None of the above

Question 7*

Evaluate the limit

$$\lim_{x \to \pi} \frac{\cos x + 1}{x - \pi}.$$

(a) 0 (b) 1 (c) $\dfrac{\sqrt{2}}{2}$ (d) $\dfrac{\sqrt{3}}{2}$ (e) None of the above