CSD1251/CSD1250 Homework 5

Due: 12th February 2023, 2359 HRS

For each question, key in **the** correct option into the homework into the "Homework 5" option in the "29 January to 4 February" section in our meta course page on Moodle. **Starred(*) questions are slightly more difficult.**

Question 1

Differentiate $f(x) = e^{\sin^2(x^2)}$.

(a) $e^{\sin^2(x^2)}$ (b) $2\sin(x^2)e^{\sin^2(x^2)}$ (c) $2\sin(x^2)\cos(x^2)e^{\sin^2(x^2)}$

(d) $2x\sin(2x^2)e^{\sin^2(x^2)}$ (e) None of the above

Question 2

Find an equation of the tangent line to the function $f(x) = 10xe^{-x^2}$ at the point $(0, 0)$.

(a) $y = 0$ (b) $y = 10$ (c) $y = 10x$

(d) $y = 10x + 10$ (e) None of the above

Question 3

Find an equation of the tangent line to the graph of $y^2 = x^3 + 3x^2$ at the point $(1, -2)$.

(a) $y = -\frac{9}{4}x + \frac{1}{4}$ (b) $y = -\frac{9}{4}x + \frac{13}{4}$ (c) $y = -\frac{9}{4}x - 2$

(d) $y = -\frac{9}{4}x - \frac{5}{4}$ (e) None of the above

Question 4

Find $\dfrac{dy}{dx}$ for the following equation.

$$\cos(x^2+2y)+xe^{y^2}=1$$

(a) $\dfrac{2x\sin(x^2+2y)}{2xye^{y^2}-2\sin(x^2+2y)}$ (b) $\dfrac{2x\sin(x^2+2y)-e^{y^2}}{2xye^{y^2}-2\sin(x^2+2y)}$

(c) $\dfrac{-e^{y^2}}{2xye^{y^2}-2\sin(x^2+2y)}$ (d) $\dfrac{2x\sin(x^2+2y)-e^{y^2}}{xe^{y^2}-2\sin(x^2+2y)}$ (e) None of the above

Question 5

There is only one critical point c of the function $f(x)=x^2+x$. Find c.

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

Question 6

For the function f in Question 5, find **an** interval where f is increasing.

(a) $(-1,\infty)$ (b) $(-\infty,0)$ (c) $(0,1)$ (d) $(-2,\infty)$ (e) None of the above

Question 7

For the function f in Question 5, find **an** interval where f is decreasing.

(a) $(1,\infty)$ (b) $(-\infty,-1)$ (c) $(0,1)$ (d) $(0,\infty)$ (e) None of the above