Question 1

Not yet answered

Marked out of 10

If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Let $f(x) = \tanh \frac{1}{x}$ for $x > 0$ and $e^x - x$ for $x < 0$. Choose $f(0) = \boxed{\text{a}}$ such that f is differentiable at $x = 0$.

With $f(0) = \boxed{\text{a}}$, $f'(0) = \boxed{\text{b}}$.

$\boxed{\text{a}}$: $\boxed{\text{b}}$:

Question 2

Not yet answered

Marked out of 25

If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Calculate the following derivatives.

$f(x) = x^3 + 4x^2 - 4, f'(2) = \boxed{\text{a}}$.

$g(x) = \sin x, g'(\frac{\pi}{6}) = \frac{\sqrt{\boxed{\text{b}}}}{\boxed{\text{c}}}$.

$h(x) = \sqrt{x}, h'(9) = \frac{\boxed{\text{d}}}{\boxed{\text{e}}}$.

$\boxed{\text{a}}$: $\boxed{\text{b}}$: $\boxed{\text{c}}$: $\boxed{\text{d}}$: $\boxed{\text{e}}$:

Question 3

Not yet answered

Marked out of 35

If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

$f(x) = x \sin x, f'(\frac{\pi}{4}) = \frac{1}{\sqrt{\boxed{\text{a}}}}(\frac{\pi}{\boxed{\text{b}}} + \boxed{\text{c}})$

$g(x) = \log(x^2 + 1), g'(2) = \frac{\boxed{\text{d}}}{\boxed{\text{e}}}$.

$h(x) = \frac{x}{x^2 - 1}, h'(2) = \frac{\boxed{\text{f}}}{\boxed{\text{g}}}$.

$\boxed{\text{a}}$: $\boxed{\text{b}}$: $\boxed{\text{c}}$: $\boxed{\text{d}}$: $\boxed{\text{e}}$: $\boxed{\text{f}}$: $\boxed{\text{g}}$:

Question 4

Not yet answered

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If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Let $f(x) = x^3 - 3x^2 - 2$. It has two stationary points: $x = \boxed{\text{a}}, \boxed{\text{b}}$ ($\boxed{\text{a}} < \boxed{\text{b}}$).

$\boxed{\text{a}}$: $\boxed{\text{b}}$:

Let $f(x) = xe^{x^2-3x}$. It has two stationary points: $x = \frac{\boxed{\text{c}}}{\boxed{\text{d}}}, \boxed{\text{e}}$.

$\boxed{\text{c}}$: $\boxed{\text{d}}$: $\boxed{\text{e}}$:

Question 5

Not yet answered

Marked out of 10

If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Let $f(x) = \frac{x-1}{x^2-2x+2}$. f takes a minimum at $x = \boxed{\text{a}}$ and a maximum at $x = \boxed{\text{b}}$. $\boxed{\text{a}}$: $\boxed{\text{b}}$:

Question 6

Not yet answered

Marked out of 25

If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Let $f(x) = \cosh(x^3 - x)$. There are three intervals where $f(x)$ is monotonically increasing. They are $(\boxed{\text{a}}, -\frac{1}{\sqrt{\boxed{\text{b}}}}), (\boxed{\text{c}}, \frac{1}{\sqrt{\boxed{\text{d}}}}), (\boxed{\text{e}}), \infty)$.

$\boxed{\text{a}}$: $\boxed{\text{b}}$: $\boxed{\text{c}}$: $\boxed{\text{d}}$: $\boxed{\text{e}}$:

Question 7

Not yet answered

Marked out of 30

If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

The asymptotes of $f(x) = \sqrt{\frac{x^4}{x^2-1}}$ in its natural domain are $y = \boxed{\text{a}}x + \boxed{\text{b}}, y = \boxed{\text{c}}x + \boxed{\text{d}}, x = \boxed{\text{e}}, x = \boxed{\text{f}}$ (take $\boxed{\text{a}} < \boxed{\text{c}}, \boxed{\text{e}} < \boxed{\text{f}}$).

$\boxed{\text{a}}$: $\boxed{\text{b}}$: $\boxed{\text{c}}$: $\boxed{\text{d}}$: $\boxed{\text{e}}$: $\boxed{\text{f}}$:

Question 8

Not yet answered

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If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Compute the limit. $\lim_{x\to\infty} \frac{\log(e^x+1)}{\sqrt{4x^2+1}} = \frac{\boxed{\text{a}}}{\boxed{\text{b}}}$.

$\boxed{\text{a}}$: $\boxed{\text{b}}$:

Question 9

Not yet answered

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If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Write the Taylor formula as $x \to 1$ to the third order.

$$(x-1)\log(x) = \boxed{\text{a}} + \boxed{\text{b}}(x-1) + \boxed{\text{c}}(x-1)^2 + \frac{\boxed{\text{d}}}{\boxed{\text{e}}}(x-1)^3 + o((x-1)^3).$$

$\boxed{\text{a}}$: $\boxed{\text{b}}$: $\boxed{\text{c}}$: $\boxed{\text{d}}$: $\boxed{\text{e}}$:

Question 10

Not yet answered

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If not specified otherwise, fill in the blanks with **integers (possibly 0 or negative)**. A fraction should be **reduced** (for example, $\frac{1}{2}$ is accepted but not $\frac{2}{4}$), and if it is negative and the answer boxes (such as $\frac{\boxed{\text{a}}}{\boxed{\text{b}}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Compute the limit. $\lim_{x\to 0} \frac{x(e^x-1)}{\sin(3x^2)} = \frac{\boxed{\text{a}}}{\boxed{\text{b}}}$.

$\boxed{\text{a}}$: $\boxed{\text{b}}$: