Call4.

(1) **Q1**

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not).

Complete the formulae.

$$\sin(-2x) = \boxed{a} + \boxed{b}x + \boxed{c}x^2 + \frac{\boxed{d}}{\boxed{e}}x^3 + o(x^3) \text{ as } x \to 0.$$

$\boxed{a}$: $\boxed{0 \checkmark}$ $\boxed{b}$: $\boxed{-2 \checkmark}$ $\boxed{c}$: $\boxed{0 \checkmark}$ $\boxed{d}$: $\boxed{4 \checkmark}$ $\boxed{e}$: $\boxed{3 \checkmark}$

$$e^x(1+x) = \boxed{g} + \boxed{h}x + \frac{\boxed{i}}{\boxed{j}}x^2 + \frac{\boxed{k}}{\boxed{l}}x^3 \text{ as } x \to 0.$$

$\boxed{g}$: $\boxed{1 \checkmark}$ $\boxed{h}$: $\boxed{2 \checkmark}$ $\boxed{i}$: $\boxed{3 \checkmark}$ $\boxed{j}$: $\boxed{2 \checkmark}$ $\boxed{k}$: $\boxed{2 \checkmark}$ $\boxed{l}$: $\boxed{3 \checkmark}$

$$x\log(1+5x^2) = \boxed{m} + \boxed{n}x + \boxed{o}x^2 + \boxed{p}x^3 + o(x^3) \text{ as } x \to 0.$$

$\boxed{m}$: $\boxed{0 \checkmark}$ $\boxed{n}$: $\boxed{0 \checkmark}$ $\boxed{o}$: $\boxed{0 \checkmark}$ $\boxed{p}$: $\boxed{5 \checkmark}$

For various $\alpha, \beta \in \mathbb{R}$, study the limit:

$$\lim_{x\to 0} \frac{\sin(-2x) + e^x(1+x) + \alpha + \beta x^2}{x\log(1+5x^2)}.$$

This limit converges for $\alpha = \boxed{q}$, $\beta = \frac{\boxed{r}}{\boxed{s}}$.

$\boxed{q}$: $\boxed{-1 \checkmark}$ $\boxed{r}$: $\boxed{-3 \checkmark}$ $\boxed{s}$: $\boxed{2 \checkmark}$

In that case, the limit is $\frac{\boxed{t}}{\boxed{u}}$.

$\boxed{y}$: $\boxed{2 \checkmark}$ $\boxed{u}$: $\boxed{5 \checkmark}$

(2) **Q1**

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not).

Complete the formulae.

$$\sin(2x) = \boxed{\text{a}} + \boxed{\text{b}}x + \boxed{\text{c}}x^2 + \frac{\boxed{\text{d}}}{\boxed{\text{e}}}x^3 + o(x^3) \text{ as } x \to 0.$$

$\boxed{\text{a}}$: $\boxed{0 \quad ✓}$ $\boxed{\text{b}}$: $\boxed{2 \quad ✓}$ $\boxed{\text{c}}$: $\boxed{0 \quad ✓}$ $\boxed{\text{d}}$: $\boxed{-4 \quad ✓}$ $\boxed{\text{e}}$: $\boxed{3 \quad ✓}$

$$e^{-x}(1-x) = \boxed{\text{g}} + \boxed{\text{h}}x + \frac{\boxed{\text{i}}}{\boxed{\text{j}}}x^2 + \frac{\boxed{\text{k}}}{\boxed{\text{l}}}x^3 \text{ as } x \to 0.$$

$\boxed{\text{g}}$: $\boxed{1 \quad ✓}$ $\boxed{\text{h}}$: $\boxed{-2 \quad ✓}$ $\boxed{\text{i}}$: $\boxed{3 \quad ✓}$ $\boxed{\text{j}}$: $\boxed{2 \quad ✓}$ $\boxed{\text{k}}$: $\boxed{-2 \quad ✓}$ $\boxed{\text{l}}$: $\boxed{3 \quad ✓}$

$$x\log(1+3x^2) = \boxed{\text{m}} + \boxed{\text{n}}x + \boxed{\text{o}}x^2 + \boxed{\text{p}}x^3 + o(x^3) \text{ as } x \to 0.$$

$\boxed{\text{m}}$: $\boxed{0 \quad ✓}$ $\boxed{\text{n}}$: $\boxed{0 \quad ✓}$ $\boxed{\text{o}}$: $\boxed{0 \quad ✓}$ $\boxed{\text{p}}$: $\boxed{3 \quad ✓}$

For various $\alpha, \beta \in \mathbb{R}$, study the limit:

$$\lim_{x\to 0} \frac{\sin(2x) + e^{-x}(1-x) + \alpha + \beta x^2}{x\log(1+3x^2)}.$$

This limit converges for $\alpha = \boxed{\text{q}}, \beta = \frac{\boxed{\text{r}}}{\boxed{\text{s}}}$.

$\boxed{\text{q}}$: $\boxed{-1 \quad ✓}$ $\boxed{\text{r}}$: $\boxed{-3 \quad ✓}$ $\boxed{\text{s}}$: $\boxed{2 \quad ✓}$

In that case, the limit is $\frac{\boxed{\text{t}}}{\boxed{\text{u}}}$.

$\boxed{\text{y}}$: $\boxed{-2 \quad ✓}$ $\boxed{\text{u}}$: $\boxed{3 \quad ✓}$

(3) **Q2**

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).

Let us study the following series $\sum_{n=0}^{\infty} \frac{9^n-1}{n^2+1}(x+1)^{2n}$, with various x.

This series makes sense also for $x \in \mathbb{C}$. For $x = i$, calculate the partial sum $\sum_{n=0}^{2} \frac{9^n-1}{n^2+1}(x+1)^{2n} = \boxed{\text{a}} + i\boxed{\text{b}}$.

$\boxed{\text{a}}$: $\boxed{-64 \quad ✓}$ $\boxed{\text{b}}$: $\boxed{8 \quad ✓}$

In order to discuss the convergence using the ratio test for $x \in \mathbb{R}$, we put $a_n = \frac{9^n-1}{n^2+1}(x+1)^{2n}$. Complete the formula.

$$\lim_{n\to\infty} \frac{a_{n+1}}{a_n} = \boxed{\text{c}}|x + \boxed{\text{d}}|^{\boxed{\text{e}}}$$

$\boxed{\text{c}}$: $\boxed{9 \quad ✓}$ $\boxed{\text{d}}$: $\boxed{1 \quad ✓}$ $\boxed{\text{e}}$: $\boxed{2 \quad ✓}$

Therefore, by the root test, the series converges absolutely for

- all x.
- $-3 < x < -1$.
- $-3 < x < 1$.
- $-\frac{4}{3} < x < -\frac{2}{3}$. ✓
- $-\frac{8}{9} < x < -\frac{1}{9}$.
- $\frac{1}{9} < x < \frac{8}{9}$.
- $\frac{2}{3} < x < \frac{4}{3}$.
- $-1 < x < 1$.
- $-1 < x < 3$.
- $x = 0$.
- $1 < x < 3$.

For the case $x = -\frac{3}{2}$, the series

- converges absolutely.
- converges but not absolutely.
- diverges. ✓

For the case $x = 1$, the series

- converges absolutely.
- converges but not absolutely.
- diverges. ✓

(4) **Q2**

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).

Let us study the following series $\sum_{n=0}^{\infty} \frac{9^n-1}{n^2+1}(x-1)^{2n}$, with various x.

This series makes sense also for $x \in \mathbb{C}$. For $x = i$, calculate the partial sum $\sum_{n=0}^{2} \frac{9^n-1}{n^2+1}(x-1)^{2n} = \boxed{\text{a}} + i\boxed{\text{b}}$.

$\boxed{\text{a}}$: $\boxed{-64 \quad ✓}$ $\boxed{\text{b}}$: $\boxed{-8 \quad ✓}$

In order to discuss the convergence using the ratio test for $x \in \mathbb{R}$, we put $a_n = \frac{9^n-1}{n^2+1}(x-1)^{2n}$. Complete the formula.

$$\lim_{n\to\infty} \frac{a_{n+1}}{a_n} = \boxed{\text{c}}|x + \boxed{\text{d}}|^{\boxed{\text{e}}}$$

$\boxed{\text{c}}$: $\boxed{9 \ \checkmark}$ $\boxed{\text{d}}$: $\boxed{-1 \ \checkmark}$ $\boxed{\text{e}}$: $\boxed{2 \ \checkmark}$

Therefore, by the root test, the series converges absolutely for

- all x.
- $-3 < x < -1$.
- $-3 < x < 1$.
- $-\frac{4}{3} < x < -\frac{2}{3}$.
- $-\frac{8}{9} < x < -\frac{1}{9}$.
- $\frac{1}{9} < x < \frac{8}{9}$.
- $\frac{2}{3} < x < \frac{4}{3}$. ✓
- $-1 < x < 1$.
- $-1 < x < 3$.
- $x = 0$.
- $1 < x < 3$.

For the case $x = \frac{2}{3}$, the series

- converges absolutely. ✓
- converges but not absolutely.
- diverges.

For the case $x = 1$, the series

- converges absolutely. ✓
- converges but not absolutely.
- diverges.

(5) **Q3**

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 us consider the following function

$$f(x) = \frac{xe^x}{1-x}.$$

The function $f(x)$ is not defined on the whole real line $\mathbb{R}$. Choose all the points that are **not** in the natural domain of $f(x)$.

- $-e$
- -1
- $-\frac{1}{e}$
- 0
- $\frac{1}{e}$
- 1 ✓
- e

Choose all asymptotes of $f(x)$.

- $y = -\pi$
- $y = -\frac{\pi}{2}$
- $y = -\frac{\pi}{4}$
- $y = 0$ ✓
- $y = \frac{\pi}{4}$
- $y = \frac{\pi}{2}$
- $y = e$
- $x = -1$
- $x = -\frac{1}{e}$
- $x = 0$
- $x = 1$ ✓
- $x = \frac{1}{e}$
- $y = x$
- $y = -x$
- $y = ex$

The function $f(x)$ has $\boxed{\text{a}}$ stationary point(s) in the domain

$\boxed{\text{a}}$: $\boxed{2\ ✓}$

Among the stationary point(s), there is a local maximum at

$$x = \frac{\boxed{\text{b}}}{\boxed{\text{c}}} + \frac{\sqrt{\boxed{\text{d}}}}{\boxed{\text{e}}}.$$

$\boxed{\text{b}}$: $\boxed{1\ ✓}$ $\boxed{\text{c}}$: $\boxed{2\ ✓}$ $\boxed{\text{d}}$: $\boxed{5\ ✓}$ $\boxed{\text{e}}$: $\boxed{2\ ✓}$

Choose the behaviour of $f(x)$ in the interval $(1, 2)$..

- monotonically decreasing
- monotonically increasing
- neither decreasing nor increasing ✓

(6) **Q3**

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 us consider the following function

$$f(x) = \frac{xe^{-x}}{1+x}.$$

The function $f(x)$ is not defined on the whole real line $\mathbb{R}$. Choose all the points that are **not** in the natural domain of $f(x)$.

- $-e$
- -1 ✓
- $-\frac{1}{e}$
- 0
- $\frac{1}{e}$
- 1
- e

Choose all asymptotes of $f(x)$.

- $y = -\pi$
- $y = -\frac{\pi}{2}$
- $y = -\frac{\pi}{4}$
- $y = 0$ ✓
- $y = \frac{\pi}{4}$
- $y = \frac{\pi}{2}$
- $y = e$
- $x = -1$ ✓
- $x = -\frac{1}{e}$
- $x = 0$
- $x = 1$
- $x = \frac{1}{e}$
- $y = x$
- $y = -x$
- $y = ex$

The function $f(x)$ has $\boxed{a}$ stationary point(s) in the domain

$\boxed{a}$: $\boxed{2 ✓}$

Among the stationary point(s), there is a local maximum at

$$x = \frac{\boxed{b}}{\boxed{c}} + \frac{\sqrt{\boxed{d}}}{\boxed{e}}.$$

$\boxed{b}$: $\boxed{-1 ✓}$ $\boxed{c}$: $\boxed{2 ✓}$ $\boxed{d}$: $\boxed{5 ✓}$ $\boxed{e}$: $\boxed{2 ✓}$

Choose the behaviour of $f(x)$ in the interval $(1, 2)$..

- monotonically decreasing ✓
- monotonically increasing

- neither decreasing nor increasing

(7) **Q4**

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not).

Let us calculate the following integral.

$$\int_0^{\frac{\pi}{2}} \sin^2(x) \cos\left(x + \frac{\pi}{6}\right) dx.$$

Complete the formula

$$\cos\left(x + \frac{\pi}{6}\right) = \frac{\sqrt{\boxed{a}}}{\boxed{b}} \cos x + \frac{\boxed{c}}{\boxed{d}} \sin x.$$

$\boxed{a}$: $\boxed{3 \ \checkmark}$ $\boxed{b}$: $\boxed{2 \ \checkmark}$ $\boxed{c}$: $\boxed{-1 \ \checkmark}$ $\boxed{d}$: $\boxed{2 \ \checkmark}$

Choose a primitive of $\sin^2(x)\cos(x)$.

- $\frac{1}{3}\cos^3(x)\sin(x)$
- $-\frac{1}{3}\cos^3(x)\sin(x)$
- $\frac{1}{3}\sin^3(x)$ ✓
- $-\frac{1}{3}\sin^3(x)$
- $\frac{1}{2}\cos^3(\sin(x))$
- $-\frac{1}{2}\cos^3(\sin(x))$
- $\frac{1}{2}\sin^3(\cos(x))$
- $-\frac{1}{2}\sin^3(\cos(x))$

Choose a primitive of $\sin^3(x)$.

- $-\frac{1}{4}\cos^4(x)$
- $\frac{1}{4}\sin^4(x)$
- $-\cos(x) + \frac{1}{3}\cos^3(x)$ ✓
- $\cos(x) - \frac{1}{3}\cos^3(x)$
- $-\cos(x) + \frac{1}{3}\cos^3(x)$
- $\sin(x) - \frac{1}{3}\sin^3(x)$
- $x - \frac{1}{3}\sin^3(x)$
- $x - \frac{1}{3}\cos^3(x)$
- $x + \frac{1}{4}\sin^4(x)$
- $x - \frac{1}{4}\cos^4(x)$

By continuing, we get

$$\int_0^{\frac{\pi}{2}} \sin^2(x)\cos\left(x+\frac{\pi}{6}\right)dx = \frac{\boxed{\text{e}}}{\boxed{\text{f}}} + \frac{\sqrt{\boxed{\text{g}}}}{\boxed{\text{h}}}$$

.

$\boxed{\text{e}}$: $\boxed{-1 \ \checkmark}$ $\boxed{\text{f}}$: $\boxed{3 \ \checkmark}$ $\boxed{\text{g}}$: $\boxed{3 \ \checkmark}$ $\boxed{\text{h}}$: $\boxed{6 \ \checkmark}$

(8) **Q4**

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).

Let us calculate the following integral.

$$\int_0^{\frac{\pi}{2}} \sin^2(x)\cos\left(x+\frac{7\pi}{6}\right)dx.$$

Complete the formula

$$\cos\left(x+\frac{7}{\pi}6\right) = -\frac{\sqrt{\boxed{\text{a}}}}{\boxed{\text{b}}}\cos x + \frac{\boxed{\text{c}}}{\boxed{\text{d}}}\sin x.$$

$\boxed{\text{a}}$: $\boxed{3 \ \checkmark}$ $\boxed{\text{b}}$: $\boxed{2 \ \checkmark}$ $\boxed{\text{c}}$: $\boxed{1 \ \checkmark}$ $\boxed{\text{d}}$: $\boxed{2 \ \checkmark}$

Choose a primitive of $\sin^2(x)\cos(x)$.

- $\frac{1}{3}\cos^3(x)\sin(x)$
- $-\frac{1}{3}\cos^3(x)\sin(x)$
- $\frac{1}{3}\sin^3(x)$ ✓
- $-\frac{1}{3}\sin^3(x)$
- $\frac{1}{2}\cos^3(\sin(x))$
- $-\frac{1}{2}\cos^3(\sin(x))$
- $\frac{1}{2}\sin^3(\cos(x))$
- $-\frac{1}{2}\sin^3(\cos(x))$

Choose a primitive of $\sin^3(x)$.

- $-\frac{1}{4}\cos^4(x)$
- $\frac{1}{4}\sin^4(x)$
- $-\cos(x)+\frac{1}{3}\cos^3(x)$ ✓
- $\cos(x)-\frac{1}{3}\cos^3(x)$
- $-\cos(x)+\frac{1}{3}\cos^3(x)$
- $\sin(x)-\frac{1}{3}\sin^3(x)$
- $x-\frac{1}{3}\sin^3(x)$

- $x - \frac{1}{3}\cos^3(x)$
- $x + \frac{1}{4}\sin^4(x)$
- $x - \frac{1}{4}\cos^4(x)$

By continuing, we get

$$\int_0^{\frac{\pi}{2}} \sin^2(x)\cos\left(x + \frac{7\pi}{6}\right)dx = \frac{\boxed{e}}{\boxed{f}} - \frac{\sqrt{\boxed{g}}}{\boxed{h}}$$

.

$\boxed{e}$: $\boxed{1\ \checkmark}$ $\boxed{f}$: $\boxed{3\ \checkmark}$ $\boxed{g}$: $\boxed{3\ \checkmark}$ $\boxed{h}$: $\boxed{6\ \checkmark}$

(9) **Q5**

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not).

Let us consider the improper integral $\int_0^\infty f(x)dx$. Choose all function(s) $f(x)$ for which this improper integral converges.

- $f(x) = \exp(x)$
- $f(x) = \exp(-x)$ ✓
- $f(x) = x^2\exp(x)$
- $f(x) = x^2\exp(-x)$ ✓
- $f(x) = \frac{1}{x}\exp(x)$
- $f(x) = \frac{1}{x}\exp(-x)$
- $f(x) = \exp(x^2)$
- $f(x) = \exp(-x^2)$ ✓
- $f(x) = x^2\exp(x^2)$
- $f(x) = x^2\exp(-x^2)$ ✓
- $f(x) = \frac{1}{x}\exp(x^2)$
- $f(x) = \frac{1}{x}\exp(-x^2)$

Determine whether the following improper integral converges, and if so, calculate the value. If it does not converge, write $\frac{1}{0}$.

$$\int_0^\infty x^{-\frac{7}{4}}e^{-x^{-\frac{3}{4}}}dx = \frac{\boxed{a}}{\boxed{b}}.$$

$\boxed{a}$: $\boxed{4\ \checkmark}$ $\boxed{b}$: $\boxed{3\ \checkmark}$

Among the following improper integrals, choose the largest (and convergent) one and give its value $\boxed{c}$.

- $\int_0^\infty x\exp(-x/6)dx$

- $\int_0^\infty \exp(-x/6)$
- $\int_0^\infty x\exp(-x)dx$
- $\int_0^\infty \exp(-x)$
- $\int_0^\infty \frac{1}{x}\exp(-x)$
- $\int_0^\infty x\exp(-3x)dx$
- $\int_0^\infty \exp(-3x)dx$
- $\int_2^\infty \exp(-3x)dx$
- $\int_2^\infty \frac{1}{x}\exp(-3x)$
- $\int_2^\infty x\exp(-3x)dx$
- $\int_2^\infty x^2\exp(-3x)dx$

c: 36 ✓

(10) **Q5**

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not).

Let us consider the improper integral $\int_{-\infty}^0 f(x)dx$. Choose all function(s) $f(x)$ for which this improper integral converges.

- $f(x) = \exp(x)$ ✓
- $f(x) = \exp(-x)$
- $f(x) = x^2\exp(x)$ ✓
- $f(x) = x^2\exp(-x)$
- $f(x) = \frac{1}{x}\exp(x)$
- $f(x) = \frac{1}{x}\exp(-x)$
- $f(x) = \exp(x^2)$
- $f(x) = \exp(-x^2)$ ✓
- $f(x) = x^2\exp(x^2)$
- $f(x) = x^2\exp(-x^2)$ ✓
- $f(x) = \frac{1}{x}\exp(x^2)$
- $f(x) = \frac{1}{x}\exp(-x^2)$

Determine whether the following improper integral converges, and if so, calculate the value. If it does not converge, write $\frac{1}{0}$.

$$\int_0^\infty x^{-\frac{7}{5}}e^{-x^{-\frac{2}{5}}}dx = \frac{\boxed{a}}{\boxed{b}}.$$

a: 5 ✓ b: 2 ✓

Among the following improper integrals, choose the largest (and convergent) one and give its value $\boxed{\text{c}}$.

- $\int_0^\infty x\exp(-x/5)dx$
- $\int_0^\infty \exp(-x/5)$
- $\int_0^\infty x\exp(-x)dx$
- $\int_0^\infty \exp(-x)$
- $\int_0^\infty \frac{1}{x}\exp(-x)$
- $\int_0^\infty x\exp(-3x)dx$
- $\int_0^\infty \exp(-3x)dx$
- $\int_2^\infty \exp(-3x)dx$
- $\int_2^\infty \frac{1}{x}\exp(-3x)$
- $\int_2^\infty x\exp(-3x)dx$
- $\int_2^\infty x^2\exp(-3x)dx$

$\boxed{\text{c}}$: $\boxed{25 \quad \checkmark}$