**2024Call4.**

(1) **Q1**

Embedded answers | penalty 0.10

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Complete the formulae.

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

$\boxed{a}$:

Numerical | marked out of 1

| | |
|---|---|
| 0 ✓ | |

$\boxed{b}$:

Numerical | marked out of 1

| | |
|---|---|
| 2 ✓ | |

$\boxed{c}$:

Numerical | marked out of 1

| | |
|---|---|
| 0 ✓ | |

$\boxed{d}$:

Numerical | marked out of 1

| | |
|---|---|
| 1 ✓ | |

$\boxed{e}$:

Numerical | marked out of 2

| | |
|---|---|
| 6 ✓ | |

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

$\boxed{g}$:

Numerical | marked out of 1

| | |
|---|---|
| 0 ✓ | |

$\boxed{h}$:

NUMERICAL | marked out of 1

| 2 ✓ | |
|---|---|

i:

NUMERICAL | marked out of 1

| 1 ✓ | |
|---|---|

j:

NUMERICAL | marked out of 1

| 4 ✓ | |
|---|---|

k:

NUMERICAL | marked out of 1

| -1 ✓ | |
|---|---|

l:

NUMERICAL | marked out of 1

| 64 ✓ | |
|---|---|

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

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

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

p:

NUMERICAL | marked out of 6

| -4 ✓ | |
|---|---|

q:

NUMERICAL | marked out of 3

| -1 ✓ | |
|---|---|

r:

NUMERICAL | marked out of 3

| 4 ✓ | |
|---|---|

In that case, the limit is $\frac{\boxed{v}}{\boxed{w}}$.

v:

NUMERICAL | marked out of 3

| 29 ✓ | |
|---|---|

w:

NUMERICAL | marked out of 3

| 192 ✓ | |
|---|---|

(2) **Q1**

EMBEDDED ANSWERS | penalty 0.10

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Complete the formulae.

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

$\boxed{a}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 0 ✓ | |

$\boxed{b}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 3 ✓ | |

$\boxed{c}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| -1 ✓ | |

$\boxed{d}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 2 ✓ | |

$\boxed{e}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 1 ✓ | |

$\boxed{f}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 2 ✓ | |

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

$\boxed{g}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 0 ✓ | |

h:

NUMERICAL | marked out of 1

| | |
|---|---|
| 2 ✓ | |

i:

NUMERICAL | marked out of 1

| | |
|---|---|
| 1 ✓ | |

j:

NUMERICAL | marked out of 1

| | |
|---|---|
| 4 ✓ | |

k:

NUMERICAL | marked out of 1

| | |
|---|---|
| -1 ✓ | |

l:

NUMERICAL | marked out of 1

| | |
|---|---|
| 64 ✓ | |

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

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

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

p:

NUMERICAL | marked out of 6

| | |
|---|---|
| -5 ✓ | |

q:

NUMERICAL | marked out of 3

| | |
|---|---|
| 1 ✓ | |

r:

NUMERICAL | marked out of 3

| | |
|---|---|
| 4 ✓ | |

In that case, the limit is $\frac{\boxed{v}}{\boxed{w}}$.

v:

NUMERICAL | marked out of 3

| | |
|---|---|
| 31 ✓ | |

w:

NUMERICAL | marked out of 3

| 64 ✓ | |
|---|---|

(3) **Q2**

EMBEDDED ANSWERS | penalty 0.10

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Determine $r = \frac{\boxed{a}}{\boxed{b}}, \theta = \frac{\boxed{c}\pi}{\boxed{d}}$ such that $re^{i\theta} = \frac{1}{2\sqrt{2}} + i\frac{1}{2\sqrt{2}}$ and $0 \leq \frac{\boxed{c}\pi}{\boxed{d}} < 2\pi$.

$\boxed{a}$:

NUMERICAL | marked out of 2

| 1 ✓ | |
|---|---|

$\boxed{b}$:

NUMERICAL | marked out of 2

| 2 ✓ | |
|---|---|

$\boxed{c}$:

NUMERICAL | marked out of 2

| 1 ✓ | |
|---|---|

$\boxed{d}$:

NUMERICAL | marked out of 2

| 4 ✓ | |
|---|---|

Compute $\lim_{n\to\infty}(\frac{1}{2\sqrt{2}} + i\frac{1}{2\sqrt{2}})^n = \boxed{e}$.

$\boxed{e}$:

NUMERICAL | marked out of 8

| 0 ✓ | |
|---|---|

Consider the series $\sum_{n=0}^{\infty} \frac{2^n+1}{3^n+1} z^n$.

Calculate the partial sum $\sum_{n=0}^{2} \frac{2^n+1}{3^n+1} z^n = \frac{\boxed{j}}{\boxed{k}} + i\frac{\boxed{l}}{\boxed{m}}$ with $z = i$.

$\boxed{j}$:

NUMERICAL | marked out of 2

| 1 ✓ | |
|---|---|

k:

NUMERICAL | marked out of 2

| | |
|---|---|
| 2 ✓ | |

l:

NUMERICAL | marked out of 2

| | |
|---|---|
| 3 ✓ | |

m:

NUMERICAL | marked out of 2

| | |
|---|---|
| 4 ✓ | |

Find the largest $r = \frac{\boxed{p}}{\boxed{q}} > 0$ such that the series above converges for all $z \in \mathbb{C}$ with $|z| < r$.

p:

NUMERICAL | marked out of 4

| | |
|---|---|
| 3 ✓ | |

q:

NUMERICAL | marked out of 4

| | |
|---|---|
| 2 ✓ | |

For $z = -1$, the series

MULTIPLE CHOICE | marked out of 8 | One answer only

- converges absolutely ✓
- converges but not absolutely
- does not converge

(4) **Q2**

EMBEDDED ANSWERS | penalty 0.10

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Determine $r = \frac{\boxed{a}}{\boxed{b}}, \theta = \frac{\boxed{c}\pi}{\boxed{d}}$ such that $re^{i\theta} = \frac{1}{\sqrt{3}} + i\frac{1}{3}$ and $0 \leq \frac{\boxed{c}\pi}{\boxed{d}} < 2\pi$.

a:

NUMERICAL | marked out of 2

| | |
|---|---|
| 2 ( 0%) | |

b:

NUMERICAL marked out of 2

| | |
|---|---|
| 3 ( 0%) | |

c:

NUMERICAL marked out of 2

| | |
|---|---|
| 1 ( 0%) | |

d:

NUMERICAL marked out of 2

| | |
|---|---|
| 6 ( 0%) | |

Compute $\lim_{n\to\infty}(\frac{1}{\sqrt{3}} + i\frac{1}{3})^n = \boxed{e}$.

e:

NUMERICAL marked out of 8

| | |
|---|---|
| 0 ( 0%) | |

Consider the series $\sum_{n=0}^{\infty} \frac{3^n+1}{4^n+1} z^n$.

Calculate the partial sum $\sum_{n=0}^{2} \frac{3^n+1}{4^n+1} z^n = \frac{\boxed{j}}{\boxed{k}} + i\frac{\boxed{l}}{\boxed{m}}$ with $z = i$.

j:

NUMERICAL marked out of 2

| | |
|---|---|
| 7 ( 0%) | |

k:

NUMERICAL marked out of 2

| | |
|---|---|
| 17 ( 0%) | |

l:

NUMERICAL marked out of 2

| | |
|---|---|
| 4 ( 0%) | |

m:

NUMERICAL marked out of 2

| | |
|---|---|
| 5 ( 0%) | |

Find the largest $r = \frac{\boxed{p}}{\boxed{q}} > 0$ such that the series above converges for all $z \in \mathbb{C}$ with $|z| < r$.

p:

NUMERICAL marked out of 4

| | |
|---|---|
| 4 ( 0%) | |

q:

NUMERICAL | marked out of 4

| | |
|---|---|
| 3 ( 0%) | |

For $z = -\frac{4}{3}$, the series

MULTIPLE CHOICE | marked out of 8 | One answer only

- converges absolutely
- converges but not absolutely
- does not converge ✓

(5) **Q3**

EMBEDDED ANSWERS | penalty 0.10

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Let us consider the following function

$$f(x) = \frac{(x+1)(e^x+3)}{(e^x+1)}$$

This function has two oblique asymptotes. They are $y = \boxed{a}x + \boxed{b}, \boxed{c}x + \boxed{d}$ with $\boxed{a} < \boxed{c}$.

a:

NUMERICAL | marked out of 1

| | |
|---|---|
| 1 ( 0%) | |

b:

NUMERICAL | marked out of 1

| | |
|---|---|
| 1 ( 0%) | |

c:

NUMERICAL | marked out of 1

| | |
|---|---|
| 3 ( 0%) | |

d:

NUMERICAL | marked out of 1

| | |
|---|---|
| 3 ( 0%) | |

One has

$$f'(0) = \frac{\boxed{e}}{\boxed{f}}.$$

e:

NUMERICAL | marked out of 4

| | |
|---|---|
| 3 ( 0%) | |

f:

NUMERICAL | marked out of 4

| | |
|---|---|
| 2 ( 0%) | |

The function $f(x)$ has g stationary point(s) in the domain. (Hint: no need to find it (them) explicitly)

g:

NUMERICAL | marked out of 4

| | |
|---|---|
| 0 ( 0%) | |

Choose the behaviour of $f(x)$ in the interval $(-\infty, \infty)$.

MULTIPLE CHOICE | marked out of 4 | One answer only

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

(6) **Q3**

EMBEDDED ANSWERS | penalty 0.10

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Let us consider the following function

$$f(x) = \frac{(x+1)(e^x - 2)}{(e^x + 1)}$$

This function has two oblique asymptotes. They are $y = \boxed{a}x + \boxed{b}, \boxed{c}x + \boxed{d}$ with $\boxed{a} < \boxed{c}$.

a:

NUMERICAL | marked out of 1

| | |
|---|---|
| -2 ( 0%) | |

b:

NUMERICAL | marked out of 1

| | |
|---|---|
| -2 ( 0%) | |

c:

NUMERICAL | marked out of 1

| 1 ( 0%) | |
|---|---|

[d]:

NUMERICAL marked out of 1

| 1 ( 0%) | |
|---|---|

One has

$$f'(0) = \frac{\boxed{\text{e}}}{\boxed{\text{f}}}.$$

[e]:

NUMERICAL marked out of 4

| 1 ( 0%) | |
|---|---|

[f]:

NUMERICAL marked out of 4

| 4 ( 0%) | |
|---|---|

The function $f(x)$ has [g] stationary point(s) in the domain. (Hint: no need to find it (them) explicitly)

[g]:

NUMERICAL marked out of 4

| 1 ( 0%) | |
|---|---|

Choose the behaviour of $f(x)$ in the interval $(-\infty, \infty)$.

MULTIPLE CHOICE marked out of 4 One answer only

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

(7) **Q4**

EMBEDDED ANSWERS penalty 0.10

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 us calculate the following integral.

$$\int_2^3 \frac{1}{2^x + 3 + 2(2^{-x})} dx.$$

Let us change the variables $2^x = t$. Complete the formula

$$\int_2^3 \frac{1}{2^x + 3 + 2(2^{-x})} dx dx = \int_{\boxed{a}}^{\boxed{b}} \frac{1}{\log \boxed{c} (t^2 + \boxed{d} t + \boxed{e})} dt$$

$\boxed{a}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 4 ( 0%) | |

$\boxed{b}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 8 ( 0%) | |

$\boxed{c}$:

NUMERICAL | marked out of 2

| | |
|---|---|
| 2 ( 0%) | |

$\boxed{d}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 3 ( 0%) | |

$\boxed{e}$:

NUMERICAL | marked out of 1

| | |
|---|---|
| 2 ( 0%) | |

By continuing, we get

$$\int_2^3 \frac{1}{2^x + 3 + 2(2^{-x})} dx = \frac{\boxed{\boxed{f}}\boxed{g}}{\log \boxed{i}}.$$

$\boxed{f}$:

NUMERICAL | marked out of 3

| | |
|---|---|
| 27 ( 0%) | |

$\boxed{g}$:

NUMERICAL | marked out of 3

| | |
|---|---|
| 25 ( 0%) | |

$\boxed{i}$:

NUMERICAL | marked out of 3

| | |
|---|---|
| 2 ( 0%) | |

(8) **Q4**

EMBEDDED ANSWERS | penalty 0.10

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 us calculate the following integral.

$$\int_1^2 \frac{1}{2^x + 5 + 6(2^{-x})} dx.$$

Let us change the variables $2^x = t$. Complete the formula

$$\int_1^2 \frac{1}{2^x + 5 + 6(2^{-x})} dx dx = \int_{\boxed{\text{a}}}^{\boxed{\text{b}}} \frac{1}{\log \boxed{\text{c}} (t^2 + \boxed{\text{d}} t + \boxed{\text{e}})} dt$$

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

NUMERICAL | marked out of 1

| | |
|---|---|
| 2 ( 0%) | |

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

NUMERICAL | marked out of 1

| | |
|---|---|
| 4 ( 0%) | |

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

NUMERICAL | marked out of 2

| | |
|---|---|
| 2 ( 0%) | |

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

NUMERICAL | marked out of 1

| | |
|---|---|
| 5 ( 0%) | |

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

NUMERICAL | marked out of 1

| | |
|---|---|
| 6 ( 0%) | |

By continuing, we get

$$\int_1^2 \frac{1}{2^x + 5 + 6(2^{-x})} dx = \frac{\frac{\boxed{\text{f}}}{\boxed{\text{g}}}}{\log \boxed{\text{i}}}.$$

$\boxed{\text{f}}$:

NUMERICAL | marked out of 3

| | |
|---|---|
| 15 ( 0%) | |

$\boxed{\text{g}}$:

NUMERICAL | marked out of 3

| | |
|---|---|
| 14 ( 0%) | |

i:

Numerical | marked out of 3

| | |
|---|---|
| 2 ( 0%) | |

(9) **Q5**

Embedded answers | penalty 0.10

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Let us calculate the following improper integral based on definition.

$$\int_{-\infty}^{\infty} \frac{x^2}{x^6+1} dx$$

.

Choose a primitive of the integrated function $\frac{x^2}{x^6+1}$.

Multiple choice | marked out of 2 | One answer only

- $(x^6+1)^{\frac{1}{2}}$
- $3x(x^6+1)^{\frac{1}{2}}$
- $3\log(x^6+1)$
- $3x^2\log(x^6)$
- $1/(x^6+1)^2$
- $x^2/(x^6+1)^2$
- $\arctan(x^3)/3$ ✓
- $3\arctan(x^3+1)$

Calculate $\int_{-\infty}^{\infty} \frac{x^2}{x^6+1} dx = \frac{\boxed{a}\pi}{\boxed{b}}$

a:

Numerical | marked out of 1

| | |
|---|---|
| 1 ( 0%) | |

b:

Numerical | marked out of 1

| | |
|---|---|
| 3 ( 0%) | |

Let $s > 0$. Choose the value of $s$ for which the improper integral $\int_0^{\infty} \frac{x^2}{(x^6+1)^s} dx$ converges.

Multiple choice | marked out of 2 | Multiple answers allowed

- 0.1 (−100%)

- 0.2 (−100%)
- 0.3 (−100%)
- 0.4 (−100%)
- 0.5 (−100%)
- 0.6 (12.5%)
- 0.7 (12.5%)
- 0.8 (12.5%)
- 0.9 (12.5%)
- 1 (12.5%)
- 1.5 (12.5%)
- 2 (12.5%)
- 3 (12.5%)

Consider the following three improper integrals.

$$(1)\int_1^\infty x^{100}e^{-x}dx,\quad (2)\int_0^\infty x^{101}e^{-x}dx,\quad (3)\int_0^\infty e^{-100x}dx,\quad (4)\int_0^\infty e^{-x}dx.$$

Give the correct order. ([c]) < ([d]) < ([e]) < ([f]).

[c]:

NUMERICAL | marked out of 1

| | |
|---|---|
| 3 ( 13%) | |

[d]:

NUMERICAL | marked out of 1

| | |
|---|---|
| 4 ( 13%) | |

[e]:

NUMERICAL | marked out of 1

| | |
|---|---|
| 1 ( 13%) | |

[f]:

NUMERICAL | marked out of 1

| | |
|---|---|
| 2 ( 13%) | |

(10) **Q5**

EMBEDDED ANSWERS | penalty 0.10

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 $\frac{\boxed{a}}{\boxed{b}}$) have ambiguity, the negative sign should be put on the numerator (for example $\frac{-1}{2}$ is accepted but $\frac{1}{-2}$ is not). $\log x = \log_e x$, not $\log_{10} x$.

Let us calculate the following improper integral based on definition.

$$\int_{-\infty}^{\infty} \frac{x^3}{x^8+1} dx$$

.

Choose a primitive of the integrated function $\frac{x^3}{x^8+1}$.

MULTIPLE CHOICE | marked out of 2 | One answer only

- $(x^8+1)^{\frac{1}{2}}$
- $4x(x^8+1)^{\frac{1}{2}}$
- $4\log(x^8+1)$
- $4x^2\log(x^8)$
- $\arctan(x^4)/4$ ✓
- $4\arctan(x^4+1)$
- $1/(x^8+1)^2$
- $x^3/(x^8+1)^2$

Calculate $\int_{-\infty}^{\infty} \frac{x^3}{x^8+1} dx = \boxed{a}$

$\boxed{a}$:

NUMERICAL | marked out of 2

| | |
|---|---|
| 0 ( 0%) | |

Let $s > 0$. Choose the value of $s$ for which the improper integral $\int_0^{\infty} \frac{x}{(x^8+1)^s} dx$ converges.

MULTIPLE CHOICE | marked out of 2 | Multiple answers allowed

- 0.1 (−100%)
- 0.2 (−100%)
- 0.3 (9.09119%)
- 0.4 (9.09119%)
- 0.5 (9.09119%)
- 0.6 (9.09119%)
- 0.7 (9.09119%)
- 0.8 (9.09119%)
- 0.9 (9.09119%)
- 1 (9.09119%)
- 1.5 (9.09119%)
- 2 (9.09119%)
- 3 (9.09119%)

Consider the following three improper integrals.

$$(1) \int_0^{\infty} e^{-x} dx, \quad (2) \int_0^{\infty} e^{-100x} dx, \quad (3) \int_0^{\infty} x^{101} e^{-x} dx, \quad (4) \int_1^{\infty} x^{100} e^{-x} dx.$$

Give the correct order. $(\boxed{c}) < (\boxed{d}) < (\boxed{e}) < (\boxed{f})$.

c:

NUMERICAL marked out of 1

| | |
|---|---|
| 2 ( 9%) | |

d:

NUMERICAL marked out of 1

| | |
|---|---|
| 1 ( 9%) | |

e:

NUMERICAL marked out of 1

| | |
|---|---|
| 4 ( 9%) | |

f:

NUMERICAL marked out of 1

| | |
|---|---|
| 3 ( 9%) | |

*Total of marks: 230*