Assignment 4

The due date for submitting this assignment has passed.

Due on 2021-02-17, 23:59 IST.

As per our records you have not submitted this assignment.

1) Using appropriate commands in SageMath, the point on the curve $y = 1 + \sin x - \cos x$ at which the tangent line has the smallest slope in the interval $(-2, 2)$ can be identified as *1 point*

- $(0, 1)$
- $(1, 0)$
- $(-1.99999996, -1.3254424)$
- $(-1.9999999605494494, 0.5068493574319555)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$(-1.9999999605494494, 0.5068493574319555)$

2) The command `numerical_integral(f(x),1,2)` where $f(x)$ is some pre-defined real valued function of real variable gives *1 point*

- numerical value of $\int_1^2 f(x)dx$ with error
- only numerical value of $\int_1^2 f(x)dx$
- anti-derivative of $f(x)$
- results into an error

No, the answer is incorrect.
Score: 0
Accepted Answers:
numerical value of $\int_1^2 f(x)dx$ *with error*

3) The approximate value of left Riemann sum of $f(x) = x^2 + 2x - 3$ over the interval $[0, 2]$ when it is divided into 300 equal intervals is *1 point*

- 0.74
- 0.84
- 0.54
- 0.64

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.64

4) The average value of function $f(x) = x + 2^x$ over the interval $[1, 2]$ comes as *1 point*

- 1
- 0
- 4.38539
- 8.38539

No, the answer is incorrect.
Score: 0
Accepted Answers:
4.38539

5) The one of the approximate value of c for which $f(c) = \frac{1}{4}\int_{-2}^{2} f(x)dx$ where $f(x) = x\sin(x)$ is *1 point*

- 3.031187
- 1.021187
- 0
- π

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.021187

6) Consider the statements. *1 point*
p : The SageMath can output to a definite value for convergent improper integrals.
q : The special functions such as β and γ functions can be defined and used easily in SageMath.

- both p and q are true.
- p is true and q is false.
- both p and q are false.
- p is false and q is true.

No, the answer is incorrect.
Score: 0
Accepted Answers:
both p and q are true.

7) The arc length of the curve give by $x = \sin 4t; y = \cos 5t; z = \sin t; 0 \le t \le 2\pi$ by using appropriate code in SageMath is *1 point*

- 1 unit
- 6.2856 units
- 3.1416 units
- 27.5910 units

No, the answer is incorrect.
Score: 0
Accepted Answers:
27.5910 units

8) The area enclosed between two curves $f(x) = x$ and $g(x) = x^3$ in the interval $[-2, 2]$ can be found by using `solve` and `integral` commands in SageMath and it is *1 point*

- -1
- 1
- 0
- $\frac{1}{2}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{2}$

9) The volume of the solid obtained by rotating the region bounded by $y = x^2 - 2x + 3$, $x = 1$, $x = 4$ about the x -axis is *1 point*

- $\frac{3}{5}\pi$
- $\frac{15}{7}\pi$
- 2π
- $\frac{483}{5}\pi$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{483}{5}\pi$

10) Consider the following SageMath codes *1 point*

```
var('theta')
r = 2 + 2*cos(theta)
integral(1/2*r^2,theta, 0, 2*pi)
```

This code will output to

- arc length of the curve $r = 2 + 2\cos\theta, 0 \le \theta \le 2\pi$
- area under the curve $r = 2 + 2\cos\theta, 0 \le \theta \le 2\pi$
- area enclosed by the curve $r = 2 + 2\cos\theta, 0 \le \theta \le 2\pi$
- half of the area enclosed by the curve $r = 2 + 2\cos\theta, 0 \le \theta \le 2\pi$

No, the answer is incorrect.
Score: 0
Accepted Answers:
area enclosed by the curve $r = 2 + 2\cos\theta, 0 \le \theta \le 2\pi$

11) The arc length of the curve $r = \cos^2\frac{\theta}{3}, 0 \le \theta \le \pi$ is *1 point*

- 3.404249
- 2.404249
- π
- 2π

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.404249

12) *1 point*

```
var(x,y)
f(x,y) = (2*x^2+y^2)/(x^2-2*y^2)
bool(limit(limit(f(x,y),x=0),y=0)==limit(limit(f(x,y),y=0),x=0))
```

The purpose of this code is to verify that

- iterated limits are always equal irrespective of order
- order of variables is important in evaluation of iterated limits
- continuous function may not be differentiable
- continuous functions are integrable

No, the answer is incorrect.
Score: 0
Accepted Answers:
order of variables is important in evaluation of iterated limits

13) The coefficient of x^8 in the Taylor's expansion of the function $f(x, y) = x^{13} - 3y + e^{-x}$ when expanded at the point $(0, 20)$ with 8^{th} degree polynomial using the inbuilt command in SageMath is *1 point*

- $\frac{1}{40}$
- $\frac{1}{10420}$
- $\frac{1}{60}$
- $\frac{1}{40320}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{40320}$

14) One of the critical points of the function $f(x, y) = x^3 + y^3 + 3x^2 - 15x$ determined by using appropriate commands in SageMath is *1 point*

- $(\sqrt{6} - 1, 0)$
- $(\sqrt{6}, 1)$
- $(\sqrt{6} + 1, 1)$
- $(\sqrt{6}, 0)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$(\sqrt{6} - 1, 0)$

15) Which of the following point of the function $f(x, y) = x^3 + y^3 + 3x^2 - 9x - 8y$ determined by using appropriate commands in SageMath is a point of local maximum? *1 point*

- $\left(\sqrt{\frac{8}{3}}, -3\right)$
- $\left(-3, -\sqrt{\frac{8}{3}}\right)$
- $\left(-3, \sqrt{\frac{8}{3}}\right)$
- $\left(\sqrt{\frac{8}{3}}, -2\right)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\left(-3, -\sqrt{\frac{8}{3}}\right)$