Donna Hooshmand **Math282-23580**
Assignment HW1 due 01/13/2021 at 11:59pm PST

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1. (1 point) Calculate the double integral $\int\int_{\mathbf{R}} x\cos(2x+y)\,dA$ where **R** is the region: $0 \le x \le \frac{\pi}{6}, 0 \le y \le \frac{\pi}{4}$

____

Answer(s) submitted:

- `(sin(7pi/12)-(pi/3)cos(7pi/12)-sin(pi/3)+(pi/3)cos(pi/3)-sin(pi/4))/4`

(correct)

Correct Answers:

- `0.0468567717876956`

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2. (1 point) Calculate the volume under the elliptic paraboloid $z = 2x^2 + 3y^2$ and over the rectangle $R = [-2,2] \times [-2,2]$.

____

Answer(s) submitted:

- `128/3 + 64`

(correct)

Correct Answers:

- `106.666666666667`

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3. (1 point) Evaluate the following integral.

$$\int_1^4 \int_0^3 (4x^2+y^2)\,dx\,dy = \_\_\_\_\_\_\_\_\_\_\_\_$$

Answer(s) submitted:

- `171`

(correct)

Correct Answers:

- `171`

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4. (1 point)

Evaluate the iterated integral:

$$\int_0^7 \int_1^5 \sqrt{x+4y}\,dx\,dy$$

Answer : ________

Answer(s) submitted:

- `(1/15)( (33)^(5/2) - (29)^(5/2) - (5)^(5/2)+1)`

(correct)

Correct Answers:

- `111.467`

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5. (1 point)

Evaluate the integral.

$$\int_0^1 \int_{x^2}^1 \frac{4}{(1+y)^2}\,dydx = \_\_\_\_\_\_\_\_\_\_\_\_$$

Answer(s) submitted:

- `+4arctan(1) - 2`

(correct)

Correct Answers:

- `-2 + 3.14159265358979`

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6. (1 point)

Evaluate the integral.

$$\int_1^2 \int_0^{\ln y} e^{x+y}\,dxdy = \_\_\_\_\_\_\_\_\_\_\_\_$$

Answer(s) submitted:

- `e`

(correct)

Correct Answers:

- `e`

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7. (2 points) Evaluate the double integral $\iint_D x\cos y\,dA$, where D is bounded by $y = 0$, $y = x^2$, and $x = 5$.

Answer: ________

Answer(s) submitted:

- `(-cos(25)+1)/2`

(correct)

Correct Answers:

- `1/2*[1-cos(25)]`

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8. (2 points) Evaluate the double integral $\iint_D (x^2+8y)\,dA$, where D is bounded by $y = x$, $y = x^3$, and $x \ge 0$.

Answer: ________

Answer(s) submitted:

- `1/4+4/3-1/6-4/7`

(correct)

Correct Answers:

- `4/21*4+1/12`

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9. (2 points) Evaluate the double integral $I = \int\int_{\mathbf{D}} xy\,dA$ where **D** is the triangular region with vertices $(0,0), (2,0), (0,2)$.

____

Answer(s) submitted:

- `6-16/3`

(correct)

Correct Answers:

- `0.666666666666667`

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10. (2 points)

Find the volume of the region enclosed by $z = 1 - y^2$ and $z = y^2 - 1$ for $0 \le x \le 39$.

$V =$ ________

Answer(s) submitted:

- `104`

(correct)

Correct Answers:

- `104`

11. (2 points) Find the volume of the region under the graph of $f(x,y) = 4x+y+1$ and above the region $y^2 \leq x$, $0 \leq x \leq 16$.

volume = ________

Answer(s) submitted:

- `(1024)16/5 + (64)4/3`

(correct)

Correct Answers:

- `4*4*4^5/5+4*4^3/3`

12. (2 points)

Find the volume of the solid bounded by the planes $x=0$, $y=0$, $z=0$ and $5x+2y+z=10$.

As a double integral, the volume is

$V = \int_a^b \int_c^d$ ________ $dydx$

where

$a =$ ________

$b =$ ________

$c =$ ________

$d =$ ________

By evaluating the double integral, the volume is

$V =$ ________

Answer(s) submitted:

- `10-5x-2y`
- `0`
- `2`
- `0`
- `(10-5x)/2`
- `50/3`

(correct)

Correct Answers:

- `10-5*x-2*y`
- `0`
- `2`
- `0`
- `5-2.5*x`
- `(5**2)*(2**2)/6`

13. (2 points) Set up a double integral in rectangular coordinates for calculating the volume of the solid under the graph of the function $f(x,y) = 33-x^2-y^2$ and above the plane $z=8$.

Instructions: Please enter the integrand in the first answer box. Depending on the order of integration you choose, enter *dx* and *dy* in either order into the second and third answer boxes with only one *dx* or *dy* in each box. Then, enter the limits of integration.

$\int_A^B \int_C^D$ ________ ___ ___

A = ________

B = ________

C = ________

D = ________

Answer(s) submitted:

- `25-x^2-y^2`

(correct)

Correct Answers:

- `25-x^2-y^2; dx; dy; -5; 5; -[sqrt(25-y^2)]; sqrt(25-y^2)`

14. (1 point) Match the following integrals with the verbal descriptions of the solids whose volumes they give. Put the letter of the verbal description to the left of the corresponding integral.

___1. $\int_0^2 \int_{-2}^2 \sqrt{4-y^2}\, dydx$

___2. $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} 1-x^2-y^2\, dydx$

___3. $\int_0^1 \int_{y^2}^{\sqrt{y}} 4x^2+3y^2\, dxdy$

___4. $\int_{-2}^2 \int_4^{4+\sqrt{4-x^2}} 4x+3y\, dydx$

___5. $\int_0^{\frac{1}{\sqrt{3}}} \int_0^{\frac{1}{2}\sqrt{1-3y^2}} \sqrt{1-4x^2-3y^2}\, dxdy$

A. One half of a cylindrical rod.
B. Solid bounded by a circular paraboloid and a plane.
C. Solid under an elliptic paraboloid and over a planar region bounded by two parabolas.
D. One eighth of an ellipsoid.
E. Solid under a plane and over one half of a circular disk.

Answer(s) submitted:

- `A`
- `B`
- `C`
- `E`
- `D`

(correct)

Correct Answers:

- `A`
- `B`
- `C`
- `E`
- `D`

15. (2 points)

Suppose R is the shaded region in the figure, and $f(x,y)$ is a continuous function on R. Find the limits of integration for the following iterated integrals.

(a) $\iint\limits_R f(x,y)\,dA = \int_A^B \int_C^D f(x,y)\,dy\,dx$

A = ____________

B = ____________

C = ____________

D = ____________

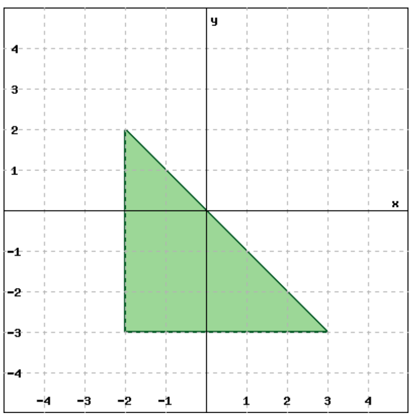
(b) $\iint\limits_R f(x,y)\,dA = \int_E^F \int_G^H f(x,y)\,dx\,dy$

E = ____________

F = ____________

G = ____________

H = ____________



Answer(s) submitted:

- `-2`
- `3`
- `-3`
- `-x`
- `-3`
- `2`
- `-2`
- `-y`

(correct)

Correct Answers:

- `-2`
- `3`
- `-3`
- `2-(x+2)`
- `-3`
- `2`
- `-2`
- `-(2+y-2)`

16. (3 points)

Consider the following integral. Sketch its region of integration in the xy-plane.

$$\int_0^2 \int_{e^y}^{e^2} \frac{x}{\ln(x)}\,dx\,dy$$

(a) Which graph shows the region of integration in the xy-plane? [?/A/B/C/D]

(b) Write the integral with the order of integration reversed:

$$\int_0^2 \int_{e^y}^{e^2} \frac{x}{\ln(x)}\,dx\,dy = \int_A^B \int_C^D \frac{x}{\ln(x)}\,dy\,dx$$

with limits of integration

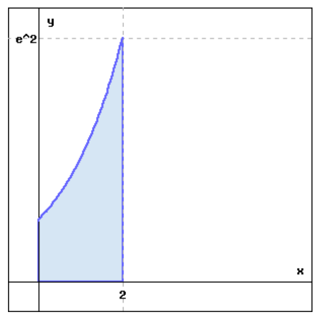
A = ________

B = ________

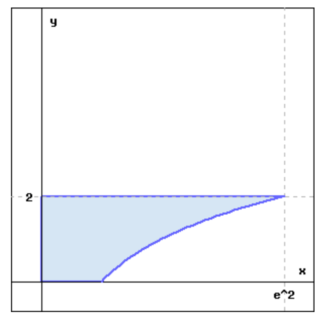
C = ________

D = ________

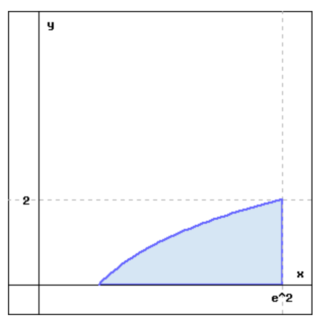
(c) Evaluate the integral. ________________



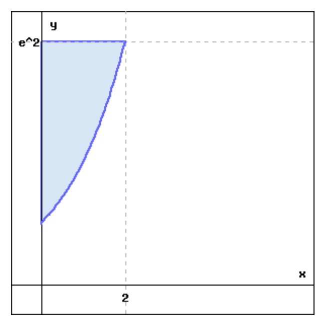
A



B



C



D

(Click on a graph to enlarge it)

Answer(s) submitted:

- `C`
- `1`
- `e^2`
- `0`
- `lnx`
- `(1/2) (e^4 - 1)`

(correct)

Correct Answers:

- C
- 1
- e^2
- 0
- ln(x)
- [e^(2*2)-1]/2

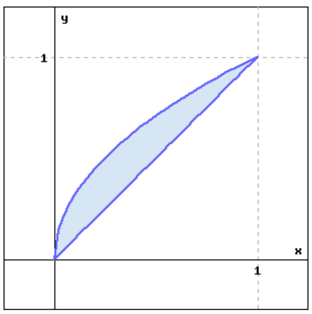
17. (1 point)

Consider the following integral. Sketch its region of integration in the xy-plane.

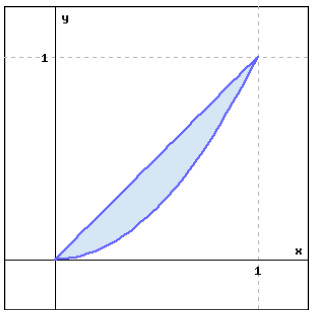
$$\int_0^1 \int_y^{\sqrt{y}} 120x^3y^3\,dx\,dy$$

(a) Which graph shows the region of integration in the xy-plane? [?/A/B]

(b) Evaluate the integral. ____________________



A



B

(Click on a graph to enlarge it)

Answer(s) submitted:

- B
- 5-15/4

(correct)

Correct Answers:

- B
- 1.25

18. (2 points) Evaluate the integral

$$\int_0^2 \int_y^2 \sin(x^2)\,dx\,dy$$

by reversing the order of integration.

With order reversed,

$$\int_a^b \int_c^d \sin(x^2)\,dy\,dx,$$

where $a =$ ___, $b =$ ___, $c =$ ___, and $d =$ ___.

Evaluating the integral, $\int_0^2 \int_y^2 \sin(x^2)\quad dx\,dy =$ ____________________

Answer(s) submitted:

- 0
- 2
- 0
- x
- (-cos(4)+1)/2

(correct)

Correct Answers:

- 0
- 2
- 0
- x
- 1/2*[1-cos(2*2)]

19. (3 points)

Consider the following integral. Sketch its region of integration in the xy-plane.

$$\int_0^2 \int_{y^2}^4 y\sin(x^2)\,dx\,dy$$

(a) Which graph shows the region of integration in the xy-plane? [?/A/B/C/D]

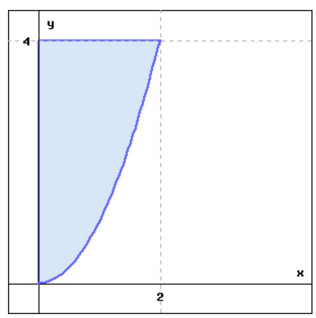
(b) Write the integral with the order of integration reversed:

$$\int_0^2 \int_{y^2}^4 y\sin(x^2)\,dx\,dy = \int_A^B \int_C^D y\sin(x^2)\,dy\,dx$$

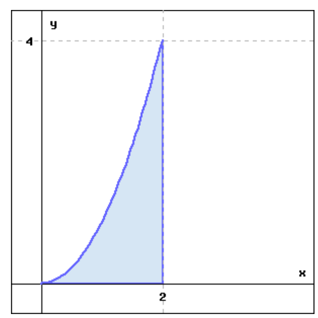
with limits of integration

A = __________
B = __________
C = __________
D = __________

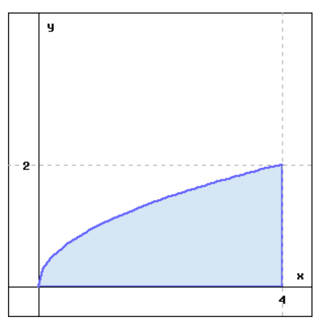
(c) Evaluate the integral. ____________________



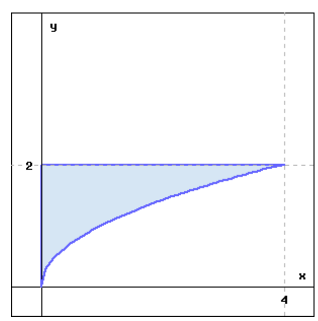
A



B



C



D

(Click on a graph to enlarge it)

Answer(s) submitted:

- C
- 0
- 4
- 0
- sqrt(x)
- (-cos(16)+1)/4

(correct)
Correct Answers:

- C
- 0
- 4
- 0
- sqrt(x)
- [1-cos(2^4)]/4

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20. (2 points) In evaluating a double integral over a region D, a sum of iterated integrals was obtained as follows:

$$\iint_D f(x,y)\,dA = \int_0^3 \int_0^{(8/3)y} f(x,y)\,dxdy + \int_3^{11} \int_0^{11-y} f(x,y)\,dxdy.$$

Sketch the region D and express the double integral as an iterated integral with reversed order of integration.

$$\int_a^b \int_{g_1(x)}^{g_2(x)} f(x,y)\,dydx$$

$a =$ ________ $b =$ ________

$g_1(x) =$ ________ $g_2(x) =$ ________

Answer(s) submitted:

- 0
- 8
- 3x/8
- 11-x

(correct)
Correct Answers:

- 0
- 8
- 3*x/8
- 11-x

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21. (3 points) Let $f(x,y) = x^2 e^{x^2}$ and let R be the triangle bounded by the lines $x = 3$, $x = y/2$, and $y = x$ in the xy-plane.

(a) Express $\int_R f\,dA$ as a double integral in two different ways by filling in the values for the integrals below. (For one of these it will be necessary to write the double integral as a sum of two integrals, as indicated; for the other, it can be written as a single integral.)

$\int_R f\,dA = \int_a^b \int_c^d f(x,y)\,d\_\_\_\ d\_\_\_$
where $a =$ ______, $b =$ ______, $c =$ ______, and $d =$ ______.

And $\int_R f\,dA = \int_a^b \int_c^d f(x,y)\,d\_\_\_\ d\_\_\_ + \int_m^n \int_p^q f(x,y)\,d\_\_\_\ d\_\_\_$
where $a =$ ______, $b =$ ______, $c =$ ______, $d =$ ______, $m =$ ______, $n =$ ______, $p =$ ______, and $q =$ ______.

(b) Evaluate one of your integrals to find the value of $\int_R f\,dA$.
$\int_R f\,dA =$ ____________

Answer(s) submitted:

- y
- x
- 0
- 3
- x
- 2x
- x
- y
- x
- y
- 0
- 3
- y/2
- y
- 3
- 6
- y/2
- 3
- (8e^9 + 1)/2

(correct)
Correct Answers:

- y
- x
- 0
- 3
- x
- 2*x
- x
- y
- x
- y
- 0
- 3
- y/2
- y
- 3
- 6
- y/2
- 3
- [(3*3-1)*e^(3*3)/2+1/2]*(2-1)