# CENGAGE | WEBASSIGN

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← **MC 113, section B, Spring 2020**

🎓 **INSTRUCTOR**

## 15.2 - 15.6 Integrales Dobles (Homework)

**Christiaan Ketelaar**
Universidad Francisco Marroquin

### Current Score

| QUESTION | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POINTS | 1/1 | 1/1 | 1/1 | 1/1 | 1/0 | 2/2 | 1/1 | 0/1 | 2/2 | 0.8/2 | 2/0 | 2/2 | 2/2 | 2/2 | 1/0 | 2/2 | 2/2 | 2/2 |
| | ✔ | ✔ | ✔ | ✔ | ⭐ | ✔ | ✔ | ✖ | ✔ | ✔✖ | ⭐ | ✔ | ✔ | ✔ | ⭐ | ✔ | ✔ | ✔ |

**TOTAL SCORE**

| 35.8/49 | **73.1%** |
|---|---|

### Due Date   Past Due

**MON, APR 13, 2020**
12:09 AM CST

📅 Request Extension

### Assignment Submission & Scoring

**Assignment Submission**

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

**Assignment Scoring**

Your last submission is used for your score.

**The due date for this assignment has passed.**

Your work can be viewed below, but no changes can be made.

**Important!** Before you view the answer key, decide whether or not you plan to request an extension. Your Instructor may not grant you an extension if you have viewed the answer key. Automatic extensions are not granted if you have viewed the answer key.

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1.  | **1/1 POINTS** | | **PREVIOUS ANSWERS** |    **SCALCET8 15.1.015.**              **MY NOTES** | **ASK YOUR TEACHER** |

Calculate the iterated integral.

$$\int_{1}^{2}\int_{0}^{4}(6x^2y - 5x)\,dy\,dx$$

$$82

[text input box]

✔

Need Help? [Watch It] [Talk to a Tutor]

----------------------------------------------------------------------------------------------------

2.  | **1/1 POINTS** | | **PREVIOUS ANSWERS** |    **SCALCET8 15.1.019.**              **MY NOTES** | **ASK YOUR TEACHER** |

Calculate the iterated integral.

$$\int_{-3}^{3}\int_{0}^{\pi/2}(y + y^2\cos(x))\,dx\,dy$$

$$18

[text input box]

✔

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**3.** | **1/1 POINTS** | **PREVIOUS ANSWERS** | SCALCET8 15.1.027. | **MY NOTES** | **ASK YOUR TEACHER**

Calculate the double integral.

$$\iint_R x \sec^2(y)\, dA, \quad R = \left\{(x, y) \mid 0 \le x \le 4,\, 0 \le y \le \frac{\pi}{4}\right\}$$

$$8

☑

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**4.** | **1/1 POINTS** | **PREVIOUS ANSWERS** | SCALCET8 15.1.029.MI. | **MY NOTES** | **ASK YOUR TEACHER**

Calculate the double integral.

$$\iint_R \frac{3xy^2}{x^2 + 1}\, dA, \quad R = \{(x, y) \mid 0 \le x \le 1,\, -2 \le y \le 2\}$$

$$8ln(2)

☑

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**5.** | **1/0 POINTS** | **PREVIOUS ANSWERS** | SCALCET8 15.1.042. | **MY NOTES** | **ASK YOUR TEACHER**

Find the volume of the solid in the first octant bounded by the parabolic cylinder $z = 16 - x^2$ and the plane $y = 2$.
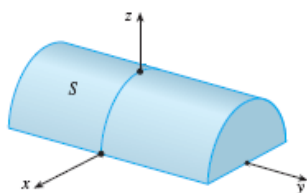
$$2563

☑

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**6.** | 2/2 POINTS | PREVIOUS ANSWERS | SCALCET8 15.1.AE.002. | MY NOTES | ASK YOUR TEACHER

**EXAMPLE 2**    If $R = \{(x, y) \mid -5 \le x \le 5, -6 \le y \le 6\}$, evaluate the integral

$$\iint_R \sqrt{25 - x^2}\, dA.$$

SOLUTION    It would be very difficult to evaluate this integral directly but, because $\sqrt{25 - x^2} \ge 0$, we can compute the integral by interpreting it as a volume. If $z = \sqrt{25 - x^2}$, then $x^2 + z^2 = \boxed{25}$ ✔ and $z \ge 0$, so the given double integral represents the volume of the solid $S$ that lies below the circular cylinder $x^2 + z^2 = \boxed{25}$ ✔ and above the rectangle $R$. (See the figure.) The volume of $S$ is the area of a semicircle with radius $\boxed{5}$ ✔ times the length of the cylinder. Thus

$$\iint_R \sqrt{25 - x^2}\, dA \;=\; \frac{1}{2}\pi\left(\boxed{5}\;✔\;\right)^2 \cdot 12$$

$$=\quad \boxed{\phantom{xxxxxxxx}}$$

✔   .

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**7.** | 1/1 POINTS | PREVIOUS ANSWERS | SCALCET8 15.2.004. | MY NOTES | ASK YOUR TEACHER

Evaluate the iterated integral.

$$\int_0^{\pi/2} \int_0^x x \sin(y)\, dy\, dx$$

$$\boxed{\phantom{xxxxxxxx}}$$

✔

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**8.** | **0/1 POINTS** | **PREVIOUS ANSWERS** | **SCALCET8 15.2.007.** | **MY NOTES** | **ASK YOUR TEACHER**

Evaluate the double integral.

$$\iint_D \frac{y}{x^2 + 1} \, dA, \quad D = \{(x, y) \mid 0 \le x \le 6, 0 \le y \le \sqrt{x}\}$$

$$39785$$

✗

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**9.** | **2/2 POINTS** | **PREVIOUS ANSWERS** | **SCALCET8 15.2.017.MI.** | **MY NOTES** | **ASK YOUR TEACHER**

Evaluate the double integral.

$$\iint_D 3x \cos(y) \, dA, \; D \text{ is bounded by } y = 0, y = x^2, x = 7$$

$$32[1 - \cos(49)]$$

✔

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**10.** | 0.8/2 POINTS | | PREVIOUS ANSWERS | | SCALCET8 15.2.017.MI.SA. | | MY NOTES | | ASK YOUR TEACHER |

*This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.*
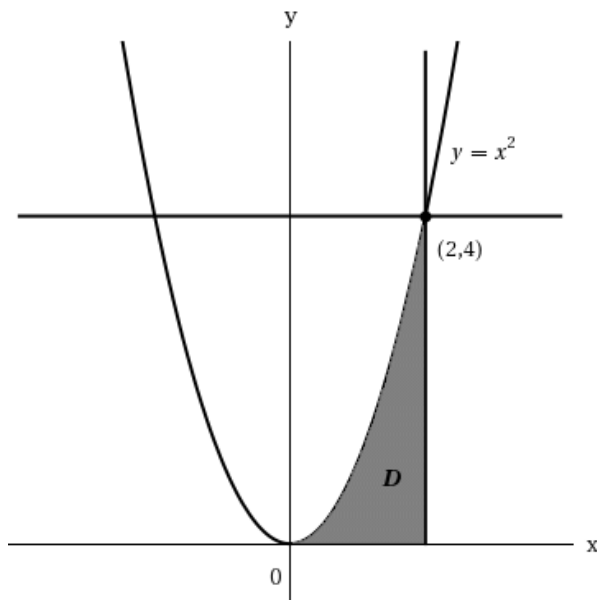
**Tutorial Exercise**

Evaluate the double integral.

$$\iint_D 8x \cos(y)\, dA,\ D \text{ is bounded by } y = 0,\ y = x^2,\ x = 2$$

**Step 1**

The region $D$ is below the parabola $y = x^2$, above the $x$-axis, and to the left of $x = 2$. This can be illustrated as follows.



Viewing this as a Type I region, we can see that for a given $x$-value, $y$ varies from the $x$-axis up to the parabola. Therefore, we have

$$\iint_D 8x \cos(y)\, dA = \int_0^{\boxed{2}} \int_0^{\boxed{x^2}} 8x \cos(y)\, dy\, dx.$$

**Step 2**

First, we have

$$\int_0^{x^2} 8x \cos(y)\, dy = \Big[ 8x \boxed{\sin(y)} \Big]_0^{x^2}$$

$$= \boxed{8x(\sin(x2))}\ .$$

**Step 3**

Now, $8 \displaystyle\int_0^2 x \sin(x^2)\, dx$ can be calculated using the substitution $u = $ ☐ *(No Response)* and $du = 2x\, dx$, which means that

$x\, dx = $ ☐ *(No Response)* $du$.

---

**11.**   [2/0 POINTS]   [PREVIOUS ANSWERS]   **SCALCET8 15.2.019.**   [MY NOTES]   [ASK YOUR TEACHER]

Evaluate the double integral.

$$\iint_D 9y^2 \, dA, \quad D \text{ is the triangular region with vertices } (0, 1), (1, 2), (4, 1)$$

$$33

[                    ]

✔

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**12.**   [2/2 POINTS]   [PREVIOUS ANSWERS]   **SCALCET8 15.2.023.**   [MY NOTES]   [ASK YOUR TEACHER]

Find the volume of the given solid.

Under the plane $3x + 2y - z = 0$ and above the region enclosed by the parabolas $y = x^2$ and $x = y^2$

$$34

[                    ]

✔

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**13.**   [2/2 POINTS]   [PREVIOUS ANSWERS]   **SCALCET8 15.2.028.**   [MY NOTES]   [ASK YOUR TEACHER]

Find the volume of the given solid.

Bounded by the planes $z = x$, $y = x$, $x + y = 6$ and $z = 0$

$$9

[                    ]

✔

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**14.** | 2/2 POINTS | PREVIOUS ANSWERS | **SCALCET8 15.2.029.** | MY NOTES | ASK YOUR TEACHER

Find the volume of the given solid.

Bounded by the cylinders $z = 6x^2$, $y = x^2$ and the planes $z = 0$, $y = 4$

$$2565

✔

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**15.** | 1/0 POINTS | PREVIOUS ANSWERS | **SCALCET8 15.2.036.** | MY NOTES | ASK YOUR TEACHER

Find the volume of the solid by subtracting two volumes, the solid enclosed by the parabolic cylinder $y = 16x^2$, and the planes $z = 3y$, $z = 2 + y$.

$$415

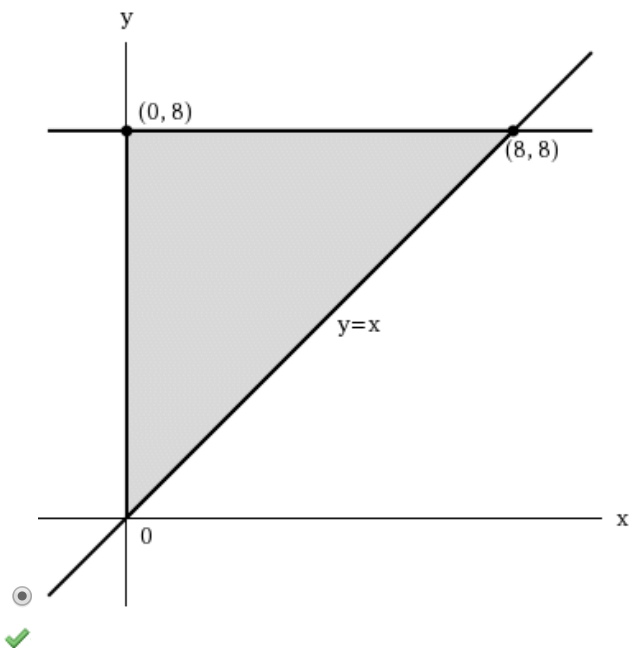✔

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**16.** | **2/2 POINTS** | **PREVIOUS ANSWERS** | **SCALCET8 15.2.045.** | **MY NOTES** | **ASK YOUR TEACHER**
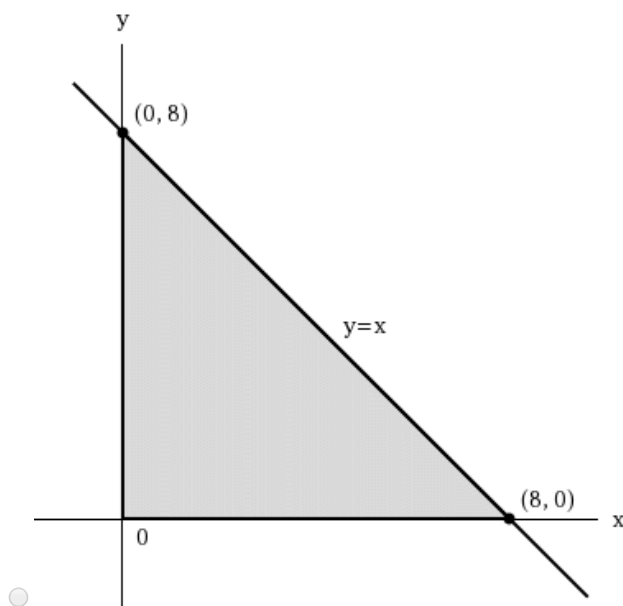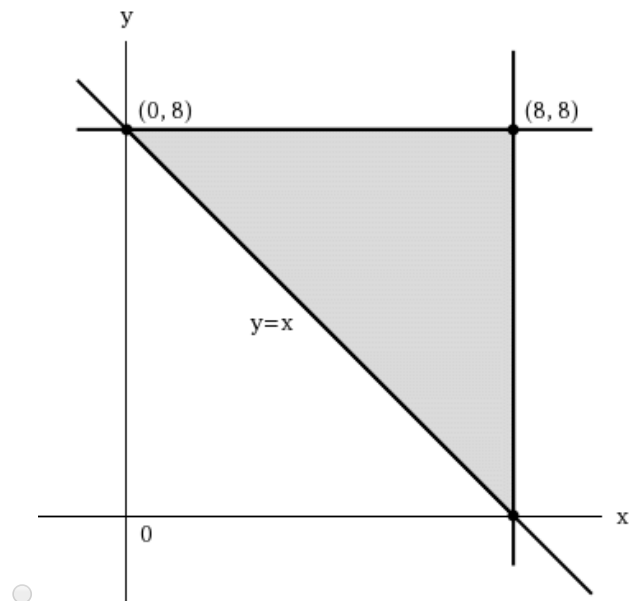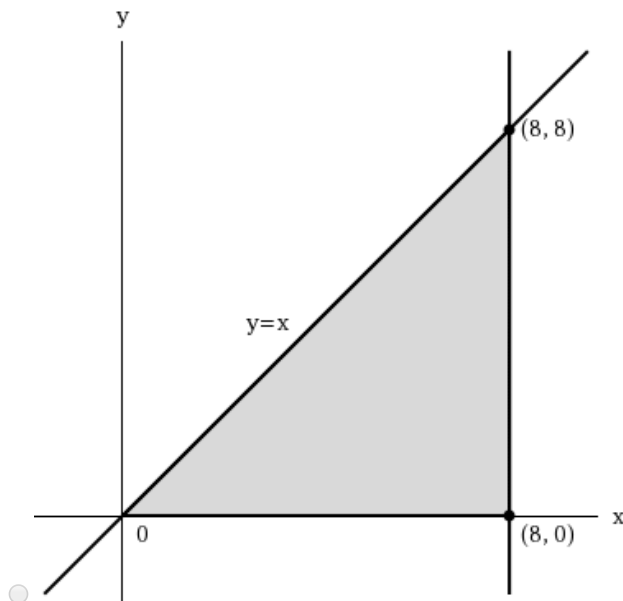
Sketch the region of integration.

$$\int_0^8 \int_0^y f(x, y)\ dx\ dy$$



Change the order of integration.

$$\int_0^{\boxed{8}\ \checkmark} \int_{\boxed{x}\ \checkmark}^{\boxed{8}\ \checkmark} f(x, y)\ dy\ dx$$

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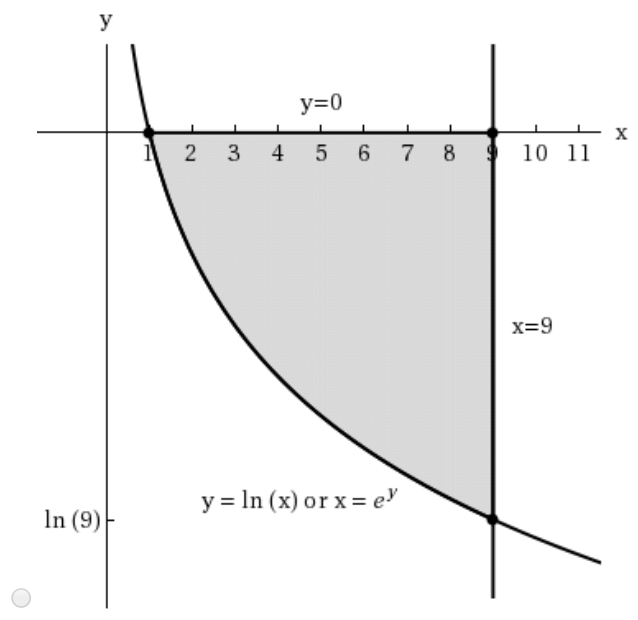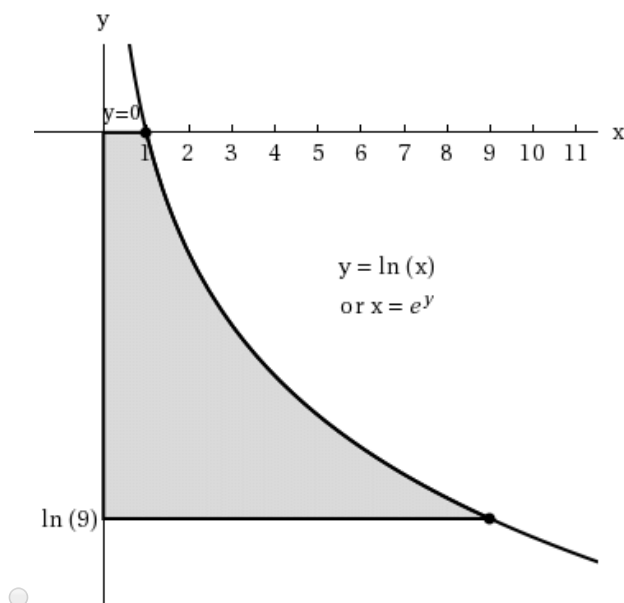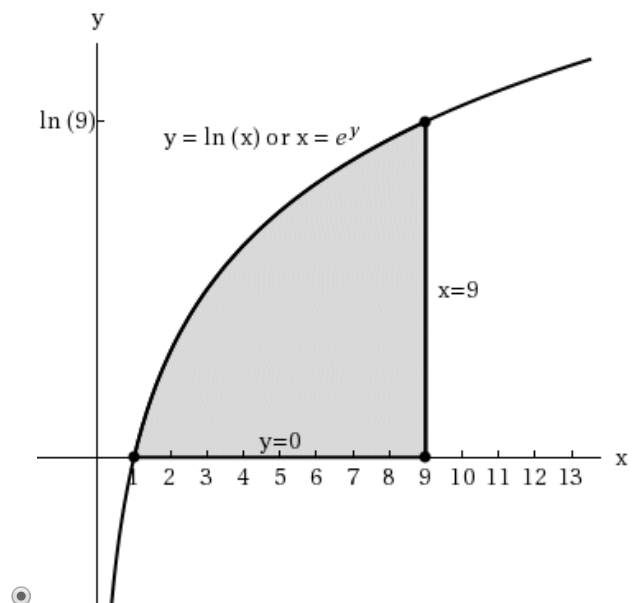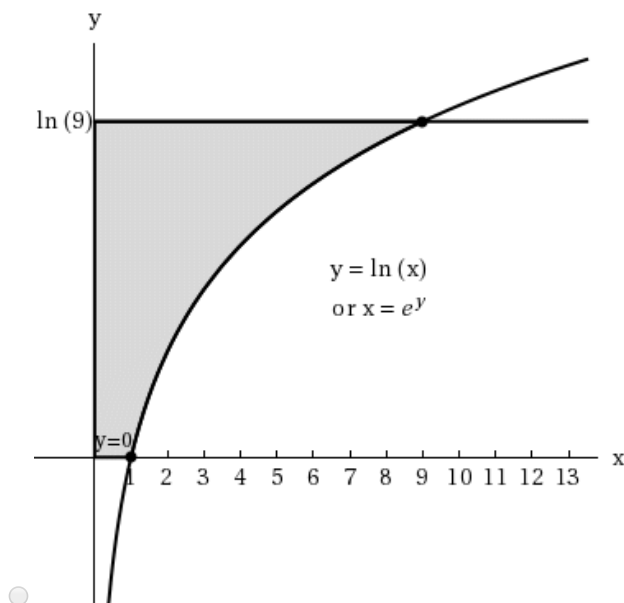**17.**   | 2/2 POINTS |   | PREVIOUS ANSWERS |   **SCALCET8 15.2.049.**   | MY NOTES |   | ASK YOUR TEACHER |

Sketch the region of integration.

$$\int_1^9 \int_0^{\ln(x)} f(x, y)\, dy\, dx$$









Change the order of integration.

$$\int_0^{\$\$\ln(9)} \int_{\$\$ey}^{\$\$9} f(x, y)\, dx\, dy$$

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**18.** [2/2 POINTS] [PREVIOUS ANSWERS] **SCALCET8 15.2.051.** [MY NOTES] [ASK YOUR TEACHER]

Evaluate the integral by reversing the order of integration.

$$\int_0^4 \int_{3y}^{12} 7e^{x^2} \, dx \, dy$$

$$76(e^{144}-1)$$

[                    ]

✔

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**19.** [–/0 POINTS] **SCALCET8 15.2.055.** [MY NOTES] [ASK YOUR TEACHER]

Evaluate the integral by reversing the order of integration.

$$\int_0^1 \int_{\arcsin(y)}^{\pi/2} \cos(x) \sqrt{9 + \cos^2(x)} \, dx \, dy$$

(No Response)

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**20.** [–/1 POINTS] **SCALCET8 15.2.056.** [MY NOTES] [ASK YOUR TEACHER]

Evaluate the integral by reversing the order of integration.

$$\int_0^{27} \int_{\sqrt[3]{y}}^{3} 3e^{x^4} \, dx \, dy$$

(No Response)

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**21.** [–/1 POINTS] **SCALCET8 15.3.007.** [MY NOTES] [ASK YOUR TEACHER]

Evaluate the given integral by changing to polar coordinates.

$$\iint_D 4x^2y \, dA, \text{ where } D \text{ is the top half of the disk with center the origin and radius } 5.$$

(No Response)

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**22.**  | **–/2 POINTS** |  **SCALCET8 15.3.009.**                                      | **MY NOTES** | **ASK YOUR TEACHER** |

Evaluate the given integral by changing to polar coordinates.

$$\iint_R \sin(x^2 + y^2)\, dA,$$ where $R$ is the region in the first quadrant between the circles with center the origin and radii 3 and 5

(No Response)

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**23.**  | **–/1 POINTS** |  **SCALCET8 15.3.012.**                                      | **MY NOTES** | **ASK YOUR TEACHER** |

Evaluate the given integral by changing to polar coordinates.

$$\iint_D \cos\left(\sqrt{x^2 + y^2}\right) dA,$$ where $D$ is the disk with center the origin and radius 9

(No Response)

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**24.**  | **–/1 POINTS** |  **SCALCET8 15.3.015.**                                      | **MY NOTES** | **ASK YOUR TEACHER** |

Use a double integral to find the area of the region.

One loop of the rose   $r = 9\cos(3\theta)$

(No Response)

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**25.**  | **–/0 POINTS** |  **SCALCET8 15.3.018.**                                      | **MY NOTES** | **ASK YOUR TEACHER** |

Use a double integral to find the area of the region.

The region inside the cardioid $r = 1 + \cos(\theta)$ and outside the circle $r = 3\cos(\theta)$

(No Response)

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**26.** | –/1 POINTS | SCALCET8 15.3.019. | MY NOTES | ASK YOUR TEACHER

Use polar coordinates to find the volume of the given solid.

Under the paraboloid $z = x^2 + y^2$ and above the disk $x^2 + y^2 \le 9$

(No Response)

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**27.** | –/2 POINTS | SCALCET8 15.3.020. | MY NOTES | ASK YOUR TEACHER

Use polar coordinates to find the volume of the given solid.

Below the cone $z = \sqrt{x^2 + y^2}$ and above the ring $1 \le x^2 + y^2 \le 25$

(No Response)

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**28.** | 2/0 POINTS | PREVIOUS ANSWERS | SCALCET8 15.3.022. | MY NOTES | ASK YOUR TEACHER

Use polar coordinates to find the volume of the given solid.

Inside the sphere $x^2 + y^2 + z^2 = 25$ and outside the cylinder $x^2 + y^2 = 9$

$$256п3

✔

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**29.** | –/2 POINTS | SCALCET8 15.3.029. | MY NOTES | ASK YOUR TEACHER

Evaluate the iterated integral by converting to polar coordinates.

$$\int_0^6 \int_0^{\sqrt{36 - x^2}} e^{-x^2 - y^2} \, dy \, dx$$

(No Response)

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**30.**  | **–/2 POINTS** | **SCALCET8 15.3.032.** | **MY NOTES** | **ASK YOUR TEACHER**

Evaluate the iterated integral by converting to polar coordinates.

$$\int_0^2 \int_0^{\sqrt{2x - x^2}} 5\sqrt{x^2 + y^2} \; dy \; dx$$
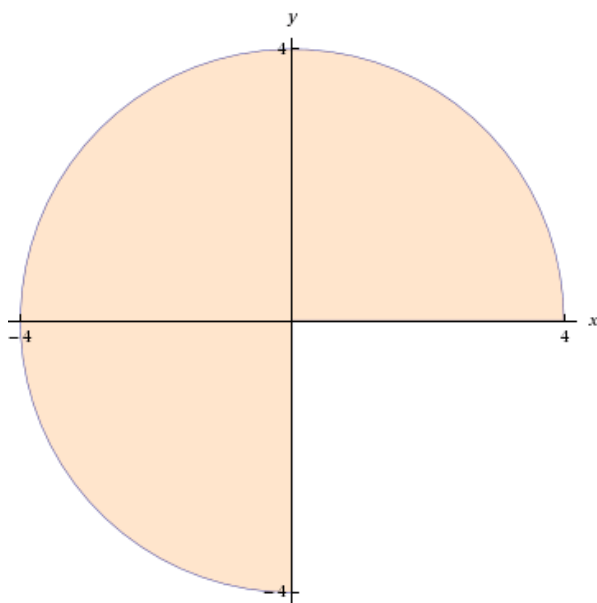
(No Response)

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**31.**  | **1/1 POINTS** | **PREVIOUS ANSWERS** | **SCALCET8 15.3.501.XP.** | **MY NOTES** | **ASK YOUR TEACHER**

A region $R$ is shown. Decide whether to use polar coordinates or rectangular coordinates and write $\iint_R f(x, y) \, dA$ as an iterated integral, where $f$ is an arbitrary continuous function on $R$.



○ $\displaystyle\int_0^{3\pi/2} \int_0^4 f(r\cos(\theta), r\sin(\theta)) \; dr \; d\theta$

◉ $\displaystyle\int_0^{3\pi/2} \int_0^4 f(r\cos(\theta), r\sin(\theta))r \; dr \; d\theta$

○ $\displaystyle\int_0^{3\pi/2} \int_0^4 f(r, \theta)r \; dr \; d\theta$

○ $\displaystyle\int_0^{3\pi/2} \int_0^4 f(x, y) \; dy \; dx$

○ $\displaystyle\int_0^{3\pi/2} \int_0^4 f(x^2 + y^2) \; dy \; dx$

✔

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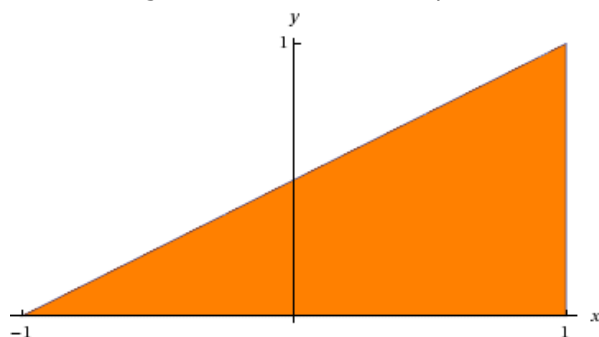
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**32.** | **1/1 POINTS** | **PREVIOUS ANSWERS** | **SCALCET8 15.3.502.XP.** | **MY NOTES** | **ASK YOUR TEACHER**

A region $R$ is shown. Decide whether to use polar coordinates or rectangular coordinates and write $\iint_R f(x, y)\, dA$ as an iterated integral, where $f$ is an arbitrary continuous function on $R$.

- ○ $\displaystyle\int_{-1}^{1}\int_{0}^{(x+1)/2} f(r, \theta)\, r\, dr\, d\theta$

- ○ $\displaystyle\int_{0}^{\pi}\int_{-1}^{1} f(r\cos(\theta),\, r\sin(\theta))\, r\, dr\, d\theta$

- ○ $\displaystyle\int_{0}^{\pi}\int_{-1}^{1} f(x, y)\, dy\, dx$

- ⦿ $\displaystyle\int_{-1}^{1}\int_{0}^{(x+1)/2} f(x, y)\, dy\, dx$

- ○ $\displaystyle\int_{0}^{x}\int_{-1}^{1} f(x, y)\, x\, dy\, dx$    ✔

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**33.** | **1/1 POINTS** | **PREVIOUS ANSWERS** | **SCALCET8 15.3.508.XP.** | **MY NOTES** | **ASK YOUR TEACHER**

Evaluate the iterated integral by converting to polar coordinates.

$$\int_{0}^{a}\int_{-\sqrt{a^2 - y^2}}^{0} 3x^2 y\, dx\, dy$$

$15a5$

[                    ]  ✔

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**34.** | **–/2 POINTS** | **SCALCET8 15.3.511.XP.** | **MY NOTES** | **ASK YOUR TEACHER**

Evaluate the given integral by changing to polar coordinates.

$$\iint_R \sqrt{81 - x^2 - y^2}\ dA$$

where $R = \left\{(x, y) \mid x^2 + y^2 \le 81, x \ge 0\right\}$.

(No Response)

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**35.** | **1/1 POINTS** | **PREVIOUS ANSWERS** | **SCALCET8 15.5.003.** | **MY NOTES** | **ASK YOUR TEACHER**

Find the area of the surface.

The part of the plane $13x + 2y + z = 26$ that lies in the first octant

$$13\sqrt{174}$$

✔

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**36.** | **2/2 POINTS** | **PREVIOUS ANSWERS** | **SCALCET8 15.5.005.** | **MY NOTES** | **ASK YOUR TEACHER**

Find the area of the surface.

The part of the paraboloid $z = 1 - x^2 - y^2$ that lies above the plane $z = -6$

$$\frac{\pi}{6}(29(32)-1)$$

✔

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**37.** | 1/1 POINTS | PREVIOUS ANSWERS | **SCALCET8 15.5.009.** | MY NOTES | ASK YOUR TEACHER

Find the area of the surface.

The part of the surface $z = xy$ that lies within the cylinder $x^2 + y^2 = 64$

$$\frac{2\pi}{3}(65\sqrt{65}-1)$$

✔

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**38.** | 1/1 POINTS | PREVIOUS ANSWERS | **SCALCET8 15.5.011.** | MY NOTES | ASK YOUR TEACHER

Find the area of the surface.

The part of the sphere $x^2 + y^2 + z^2 = a^2$ that lies within the cylinder $x^2 + y^2 = ax$ and above the $xy$-plane

$$a^2(\pi-2)$$

✔

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**39.** | –/0 POINTS | **SCALCET8 15.5.010.** | MY NOTES | ASK YOUR TEACHER

Find the area of the surface.

The part of the sphere $x^2 + y^2 + z^2 = 36$ that lies above the plane $z = 4$.

(No Response)

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**40.** | –/2 POINTS | **SCALCET8 15.5.501.XP.** | MY NOTES | ASK YOUR TEACHER

Find the area of the surface.

The part of the plane $z = 4 + 3x + 5y$ that lies above the rectangle $[0, 3] \times [1, 4]$

(No Response)

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