## Level 1:







## Level 2:

# **Level 2:** What is the value of $\int_0^{\pi} \int_0^{\pi-x} dy dx$ ?

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(a) 
$$\pi^2/2$$
 (b)  $\pi^2/3$  (c) 1 (d) 0

**Level 2:** What is the value of  $\int_0^{\pi} \int_0^{\pi-x} dy dx$ ?

(a) 
$$\pi^2/2$$
 (b)  $\pi^2/3$  (c) 1 (d) 0

**Level 2:** What is the value of  $\int_0^{\pi} \int_0^{\pi-x} dy dx$ ?

(a) 
$$\pi^2/2$$
 (b)  $\pi^2/3$  (c) 1 (d) 0

## Level 3:

(a)  $3\pi/4$  (b)  $2\pi/3$  (c)  $5\pi/3$  (d)  $\pi/2$ 

(a) 
$$3\pi/4$$
 (b)  $2\pi/3$  (c)  $5\pi/3$  (d)  $\pi/2$ 

(a)  $3\pi/4$  (b)  $2\pi/3$  (c)  $5\pi/3$  (d)  $\pi/2$ 

## Level 4:

(a) 2x - 4y = 1 (b) 2x - 4y - z = -3(c) 6x - 8y - z = 3 (d) 6x - 8y - z = 1

(a) 
$$2x - 4y = 1$$
 (b)  $2x - 4y - z = -3$   
(c)  $6x - 8y - z = 3$  (d)  $6x - 8y - z = 1$ 

(a) 2x - 4y = 1 (b) 2x - 4y - z = -3(c) 6x - 8y - z = 3 (d) 6x - 8y - z = 1

#### Level 5:

(a)  $\pi/6$  (b)  $\pi/3$  (c)  $2\pi/3$  (d)  $5\pi/6$ 

(a)  $\pi/6$  (b)  $\pi/3$  (c)  $2\pi/3$  (d)  $5\pi/6$ 

(a)  $\pi/6$  (b)  $\pi/3$  (c)  $2\pi/3$  (d)  $5\pi/6$ 

#### Level 6:

- (a) a local maximum
- (c) a saddle point

(b) a local minimum(d) not a critical point

- (a) a local maximum
- (c) a saddle point

(b) a local minimum(d) not a critical point

- (a) a local maximum
- (c) a saddle point

(b) a local minimum(d) not a critical point

## Level 7:

(a) 
$$x = 2 - 9t$$
  
 $y = 9 + 6t$   
 $z = 8 - 2t$ 

(c) 
$$x = 20 + 18t$$
  
 $y = -3 - 12t$   
 $z = 10 + 4t$ 

(b) 
$$egin{array}{c} x = 24 + 18t \ y = 12 - 12t \ z = 8 + 4t \end{array}$$

(d) 
$$\begin{array}{l} x = 2 + 9t \\ y = 9 - 6t \\ z = 10 + 2t \end{array}$$

(a) 
$$x = 2 - 9t$$
  
 $y = 9 + 6t$   
 $z = 8 - 2t$ 
(b)  $x = 24 + 18t$   
 $y = 12 - 12t$   
 $z = 8 + 4t$ 
(c)  $x = 20 + 18t$ 
(d)  $x = 2 + 9t$ 

$$\ddot{y} = -3 - 12t \ z = 10 + 4t$$

1) 
$$\begin{array}{l} x = 2 + 9t \\ y = 9 - 6t \\ z = 10 + 2t \end{array}$$

(a) 
$$x = 2 - 9t$$
  
 $y = 9 + 6t$   
 $z = 8 - 2t$ 

(c) 
$$x = 20 + 18t$$
  
 $y = -3 - 12t$   
 $z = 10 + 4t$ 

(b) 
$$egin{array}{c} x = 24 + 18t \ y = 12 - 12t \ z = 8 + 4t \end{array}$$

(d) 
$$\begin{array}{l} x = 2 + 9t \\ y = 9 - 6t \\ z = 10 + 2t \end{array}$$

## Level 8:
**Level 8:** What is the value of  $\int_0^{\pi} \int_0^{\pi-x} \frac{\sin y}{\pi-y} \, dy \, dx$ ?

**Level 8:** What is the value of  $\int_0^{\pi} \int_0^{\pi-x} \frac{\sin y}{\pi-y} dy dx$ ?

(a) **3** (b) **2** (c) **1** (d) **0** 

**Level 8:** What is the value of  $\int_0^{\pi} \int_0^{\pi-x} \frac{\sin y}{\pi-y} \, dy \, dx$ ?

(a) **3** (b) **2** (c) **1** (d) **0** 

#### IS THAT YOUR FINAL ANSWER?

**Level 8:** What is the value of  $\int_0^{\pi} \int_0^{\pi-x} \frac{\sin y}{\pi-y} dy dx$ ?

(a) **3** (b) **2** (c) **1** (d) **0** 

## Level 9:

(a) 
$$(0, -1, 0)$$
 (b)  $(2, 1, 2)$   
(c)  $(1, 1, -1)$  (d)  $(0, 0, 1)$ 

(a) 
$$(0, -1, 0)$$
 (b)  $(2, 1, 2)$   
(c)  $(1, 1, -1)$  (d)  $(0, 0, 1)$ 

IS THAT YOUR FINAL ANSWER?

(a) 
$$(0, -1, 0)$$
 (b)  $(2, 1, 2)$   
(c)  $(1, 1, -1)$  (d)  $(0, 0, 1)$ 

#### **Level 10:**

Level 10: Calculate  $\iiint_S (x^2 + y^2)^{1/2} dV$  where S is the solid between the paraboloids  $z = x^2 + y^2 - 1$ 

and  $z = -2x^2 - 2y^2 + 8$ .

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the solid between the paraboloids  $z = x^2 + y^2 - 1$ and  $z = -2x^2 - 2y^2 + 8$ .

(a)  $81\pi/2$  (b)  $36\pi\sqrt{3}/5$  (c)  $162\pi/5$  (d)  $81\pi/5$ 

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and  $z = -2x^2 - 2y^2 + 8$ .

(a)  $81\pi/2$  (b)  $36\pi\sqrt{3}/5$  (c)  $162\pi/5$  (d)  $81\pi/5$ 

**IS THAT YOUR FINAL ANSWER?** 

Level 10: Calculate  $\iiint_S (x^2 + y^2)^{1/2} dV$  where S is

the solid between the paraboloids  $z = x^2 + y^2 - 1$ and  $z = -2x^2 - 2y^2 + 8$ .

(a)  $81\pi/2$  (b)  $36\pi\sqrt{3}/5$  (c)  $162\pi/5$  (d)  $81\pi/5$ 

### **Level 11:**

(a) 
$$\langle 4/5, -3/5 \rangle$$
 (b)  $\langle -4/5, -3/5 \rangle$   
(c)  $\langle -4/5, 3/5 \rangle$  (d)  $\langle 4/5, 3/5 \rangle$ 

(a) 
$$\langle 4/5, -3/5 \rangle$$
 (b)  $\langle -4/5, -3/5 \rangle$   
(c)  $\langle -4/5, 3/5 \rangle$  (d)  $\langle 4/5, 3/5 \rangle$ 

IS THAT YOUR FINAL ANSWER?

(a) 
$$\langle 4/5, -3/5 \rangle$$
  
(c)  $\langle -4/5, 3/5 \rangle$ 

(b)  $\langle -4/5, -3/5 \rangle$ (d)  $\langle 4/5, 3/5 \rangle$ 

#### **Level 12:**

(a)  $e^{xy}$  (b)  $xe^{xy}$  (c)  $ye^{xy}$  (d) does not exist

(a)  $e^{xy}$  (b)  $xe^{xy}$  (c)  $ye^{xy}$  (d) does not exist

#### IS THAT YOUR FINAL ANSWER?

(a)  $e^{xy}$  (b)  $xe^{xy}$  (c)  $ye^{xy}$  (d) does not exist

### **Level 13:**

Level 13: What is the value of  $\iiint_S (x^2 + y^2)^{3/2} dV$ 

where S is the solid inside the cylinder  $x^2 + y^2 = 1$ , below the cone  $z = 4 - \sqrt{x^2 + y^2}$  and above the plane z = 0? Level 13: What is the value of  $\iiint_S (x^2 + y^2)^{3/2} dV$ where S is the solid inside the cylinder  $x^2 + y^2 = 1$ , below the cone  $z = 4 - \sqrt{x^2 + y^2}$  and above the plane z = 0?

(a)  $8\pi/5$  (b)  $9\pi/10$  (c)  $10\pi/3$  (d)  $19\pi/15$ 

Level 13: What is the value of  $\iiint_S (x^2 + y^2)^{3/2} dV$ where S is the solid inside the cylinder  $x^2 + y^2 = 1$ , below the cone  $z = 4 - \sqrt{x^2 + y^2}$  and above the plane z = 0?

(a)  $8\pi/5$  (b)  $9\pi/10$  (c)  $10\pi/3$  (d)  $19\pi/15$ 

IS THAT YOUR FINAL ANSWER?

Level 13: What is the value of  $\iiint_S (x^2 + y^2)^{3/2} dV$ where S is the solid inside the cylinder  $x^2 + y^2 = 1$ , below the cone  $z = 4 - \sqrt{x^2 + y^2}$  and above the plane z = 0?

(a)  $8\pi/5$  (b)  $9\pi/10$  (c)  $10\pi/3$  (d)  $19\pi/15$ 

## **Level 14:**

## (a) 1/2 (b) $\sqrt{2}/2$ (c) $\sqrt{3}/2$ (d) 1

(a) 
$$1/2$$
 (b)  $\sqrt{2}/2$  (c)  $\sqrt{3}/2$  (d) 1

#### IS THAT YOUR FINAL ANSWER?

## (a) 1/2 (b) $\sqrt{2}/2$ (c) $\sqrt{3}/2$ (d) 1

#### **Level 15:**

# Level 15: What is the value of $\int_0^{\pi} \int_0^2 \int_0^1 z x^2 \sin(xyz) \, dx \, dy \, dz \, ?$
Level 15: What is the value of  $\int_0^{\pi} \int_0^2 \int_0^1 z x^2 \sin(xyz) \, dx \, dy \, dz \, ?$ 

> (a)  $\pi/4$  (b)  $\pi/3$  (c)  $\pi/2$ (d) none of the above

## Level 15: What is the value of $\int_0^{\pi} \int_0^2 \int_0^1 z x^2 \sin(xyz) \, dx \, dy \, dz \, ?$

(a)  $\pi/4$  (b)  $\pi/3$  (c)  $\pi/2$ (d) none of the above

## IS THAT YOUR FINAL ANSWER?

Level 15: What is the value of  $\int_0^{\pi} \int_0^2 \int_0^1 z x^2 \sin(xyz) \, dx \, dy \, dz \, ?$ 

> (a)  $\pi/4$  (b)  $\pi/3$  (c)  $\pi/2$ (d) none of the above