Iniciada	quarta, 24 de junho de 2020 às 10:01
Estado	Terminada
Terminada em	quarta, 24 de junho de 2020 às 12:06
Tempo gasto	2 horas 5 minutos
Nota	**2,661** num máximo de 20,000 (**13**%)

Pergunta 1

Parcialmente correta

Nota: 0,556 em 5,000

Considere a função real de duas variáveis reais definida por $f(x,y) = 3 \cdot \sqrt{y^2 + x^2}$.

a) Determine as derivadas parciais da função em ordem a x e a y

$\frac{\partial f}{\partial x}(x,y) =$ 3

Your last answer was interpreted as follows: 3

Incorrect answer.

$\frac{\partial f}{\partial y}(x,y) =$ 3

Your last answer was interpreted as follows: 3

Incorrect answer.

b) Determine a equação da reta tangente à curva C de interseção da superfície de equação $z = f(x,y)$ com o plano $x = 3$ no ponto $P(x,y) = (3,1)$.

i) Qual é o declive da reta tangente à curva C no ponto P? $m_t =$

ii) A equação da reta tangente é dada por: $x = 3 \ \wedge \ z =$

c) A temperatura de uma placa de metal aquecida é dada por $T(x,y) = 3 \cdot \sqrt{y^2 + x^2}$.

Determine a taxa de variação de T em relação à distância no ponto no ponto $P(x,y) = (3,1)$ na direção:

i) do eixo dos xx = 3* i

Your last answer was interpreted as follows: $3 \cdot \mathrm{i}$

Incorrect answer.

ii) do eixo dos yy = 3* j

Your last answer was interpreted as follows: $3 \cdot j$

The variables found in your answer were: $[j]$

Incorrect answer.

iii) do vetor que faz um ângulo de 30° com a direção positiva do eixo dos xx = 4

Your last answer was interpreted as follows: 4

Incorrect answer.

d) Se $z = \dfrac{3 \cdot \sqrt{y^2 + x^2}}{3}$, $x = \rho\cos(\theta)$, $y = \rho\sin(\theta) \Rightarrow \dfrac{\partial^2 z}{\partial \theta^2} + \dfrac{\partial z}{\partial \rho} = \left(\dfrac{\partial z}{\partial y}\right)^2 + \left(\dfrac{\partial z}{\partial x}\right)^2$

False

Your last answer was interpreted as follows: $\mathbf{false}$

Correct answer, well done.

e) O domínio da função f não é um círculo fechado!

False

Your last answer was interpreted as follows: $\mathbf{false}$

Incorrect answer.

A correct answer is $\frac{3 \cdot x}{\sqrt{y^2+x^2}}$, which can be typed in as follows: `(3*x)/sqrt(y^2+x^2)`

A correct answer is $\frac{3 \cdot y}{\sqrt{y^2+x^2}}$, which can be typed in as follows: `(3*y)/sqrt(y^2+x^2)`

A correct answer is $\frac{3}{\sqrt{10}}$, which can be typed in as follows: `3/sqrt(10)`

A correct answer is $\frac{3 \cdot y}{\sqrt{10}} + \frac{27}{\sqrt{10}}$, which can be typed in as follows: `(3*y)/sqrt(10)+27/sqrt(10)`

A correct answer is $\frac{9}{\sqrt{10}}$, which can be typed in as follows: `9/sqrt(10)`

A correct answer is $\frac{3}{\sqrt{10}}$, which can be typed in as follows: `3/sqrt(10)`

A correct answer is $\frac{3^{\frac{5}{2}}}{2 \cdot \sqrt{10}} + \frac{3}{2 \cdot \sqrt{10}}$, which can be typed in as follows: `3^(5/2)/(2*sqrt(10))+3/(2*sqrt(10))`

A correct answer is $\mathbf{false}$.

A correct answer is $\mathbf{true}$.

Pergunta 2

Incorreta

Nota: 0,000 em 4,000

Considere o sistema de funções $\mathrm{SF}=\left\{ {\sin \left(4\cdot x \right)},{\cos \left(4\cdot x \right)} \right\}$.

a) Calcule o Wronskiano do sistema de funções SF.

$\mathrm{det}\left (W \right)=$ [ ]

b) SF constitui um Sistema Fundamental de Soluções (SFS) de uma equação diferencial de ordem 2, linear e homogénea?

False

Your last answer was interpreted as follows: $\mathbf{false}$

c) As funções de SF são soluções da equação diferencial $y''+{4}y=0$.

True

Your last answer was interpreted as follows: $\mathbf{true}$

d) Determine a solução geral da equação diferencial $y''+{16}y=0$.

$y=c_1\ast$ [ ]

$+ c_2\ast$ [ ] $\mathrm{com}\,\,c_1, c_2\,\in\mathbb{R}$.

Incorrect answer.

Incorrect answer.

Incorrect answer.

A correct answer is $-4\cdot \sin ^2\left(4\cdot x\right)-4\cdot \cos ^2\left(4\cdot x\right)$, which can be typed in as follows: `-(4*sin(4*x)^2)-4*cos(4*x)^2`

A correct answer is $\mathbf{true}$.

A correct answer is $\mathbf{false}$.

A correct answer is $\sin \left(4\cdot x \right)$, which can be typed in as follows: `sin(4*x)`

A correct answer is $\cos \left(4\cdot x \right)$, which can be typed in as follows: `cos(4*x)`

Pergunta 3

Incorreta

Nota: 0,000 em 3,000

Considere a equação diferencial $\displaystyle \frac{\mathrm{d} y}{\mathrm{d} x}+{3}y=A(x,y)$

a) A Equação diferencial é uma EDP!

True

Your last answer was interpreted as follows: $\mathbf{true}$

b) Para $\displaystyle A(x,y)=yx^2$, determine a solução particular da equação diferencial que satisfaz a a condição inicial $\displaystyle y(0)={3}$.

$\displaystyle y=f(x)\Leftrightarrow$ 3 * e^(1/3 * x * (x-9))

Your last answer was interpreted as follows: $3\cdot e^{\frac{1}{3}\cdot x\cdot \left(x-9\right)}$

The variables found in your answer were: $\left[x \right]$

c) Para **A(x,y)=x** a equação diferencial é linear de 1ª ordem!

False

Your last answer was interpreted as follows: $\mathbf{false}$

d) Para **A(x,y)=x**, determine a solução geral da equação diferencial.

y=f(x;c) x ^(-1) + %c

Your last answer was interpreted as follows: $x^{- 1 }+{\it \%c}$

The variables found in your answer were: $\left[{\it \%c} , x \right]$

Nota: introduzir a constante com %c

Incorrect answer.

Incorrect answer.

Incorrect answer.

Your answer should be an equation, but is not.

Incorrect answer.

Incorrect answer.

Your answer should be an equation, but is not.

A correct answer is $\mathbf{false}$.

A correct answer is $y=3\cdot e^{\frac{x^3}{3}-3\cdot x}$, which can be typed in as follows: `y = 3*%e^(x^3/3-3*x)`

A correct answer is $\mathbf{true}$.

A correct answer is $y=e^{- 3\cdot x }\cdot \left(\frac{\left(3\cdot x-1\right)\cdot e^{3\cdot x}}{9}+{\it \%c}\right)$, which can be typed in as follows: `y = %e^-(3*x)*(((3*x-1)*%e^(3*x))/9+%c)`

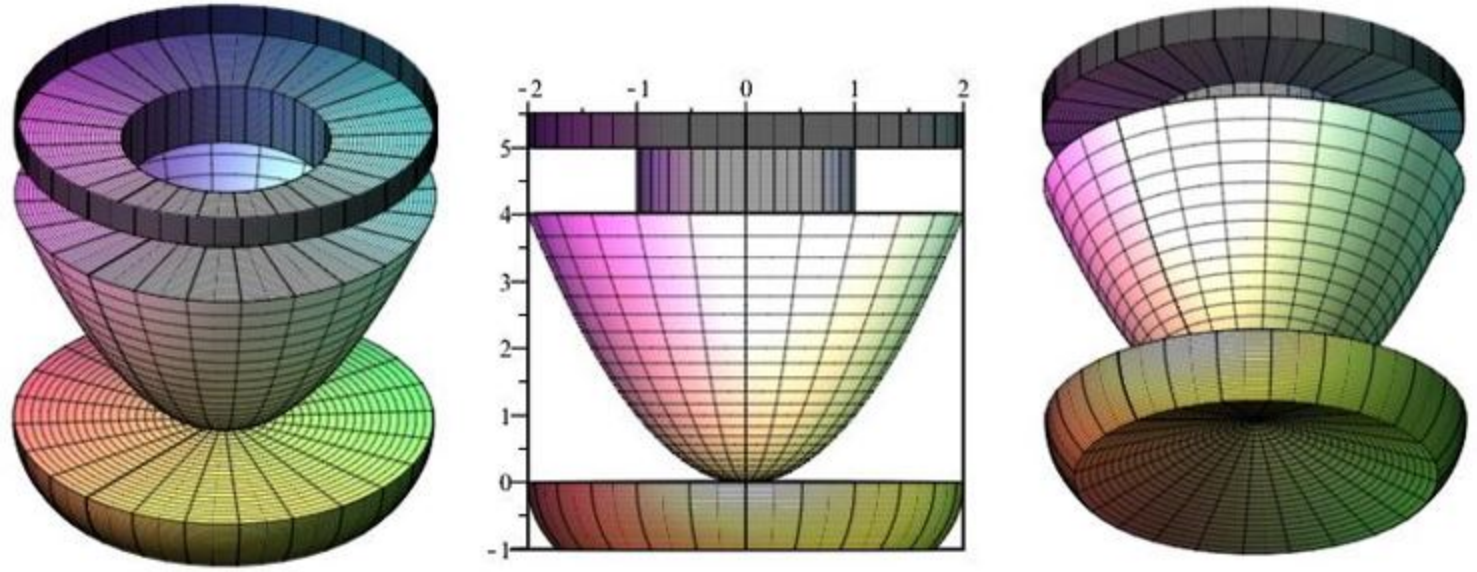
Pergunta 4

Parcialmente correta

Nota: 2,105 em 5,000

A figura seguinte representa uma 1ª versão da **Taça do Mundo de Hóquei em Patins que Portugal ganhou pela 15ª vez no dia 4 de julho de 2019 em Barcelona**. O sólido é composto por 4 partes, a saber:

- Calote esférica de raio \(r=2\) seccionada por um cone de raio \(r=\sqrt{3}\) e altura \(h=1\);
- Paraboloide de altura \(h=4\) e largura máxima de raio \(r=2\);
- Cilindro de raio \(r=1\) e altura \(h=1\);
- Cilindro de raio \(r=2\) e altura \(h=0.5\).



a) Associando os conjuntos seguintes a três sistemas de coordenadas 3D, complete-os de forma a definir corretamente o sólido \(\displaystyle S=S_1\cup S_2 \cup S_3\cup S_4 \):

\(\displaystyle S_1=\left \{ (R,\theta,\phi): 0\leq R\le r\,\wedge 0\leq \theta\leq \theta_2 \, \wedge \, {\frac{\pi}{2}}\leq \phi \leq \phi_2 \right \}\)

\(\displaystyle r =\) 2

Your last answer was interpreted as follows: \(2 \)

Correct answer, well done.

\(\displaystyle \theta_2 =\) -1

Your last answer was interpreted as follows: \(-1 \)

Incorrect answer.

\(\displaystyle \phi_2 =\) sqrt(3)

Your last answer was interpreted as follows: \(\sqrt{3} \)

Incorrect answer.

\(\displaystyle S_2=\left \{ (x,y,z)\in\mathbb{R}^3:x^2+y^2\leq 4\,\wedge f(x,y)\leq z\leq 4\right \}\)

\(\displaystyle f(x,y) =\)

\(\displaystyle S_3=\left \{ (\rho,\theta,z): 0\leq \rho\le r\,\wedge 0\leq \theta\leq \theta_2 \, \wedge \, z_1\leq z \leq 5 \right \}\)

\(\displaystyle r =\) 1

Your last answer was interpreted as follows: \(1 \)

Correct answer, well done.

\(\displaystyle \theta_2 =\) 2 *pi

Your last answer was interpreted as follows: \(2\cdot \pi \)

Correct answer, well done.

\(\displaystyle z_1 =\) 4

Your last answer was interpreted as follows: \(4 \)

Correct answer, well done.

\(\displaystyle S_4=\left \{ (\rho,\theta,z): 0\leq \rho\le r\,\wedge \theta_1\leq \theta\leq 2\pi \, \wedge \, z_1\leq z \leq 5.5 \right \}\)

\(\displaystyle r =\) 2

Your last answer was interpreted as follows: \(2 \)

Correct answer, well done.

\(\displaystyle \theta_1 =\) 0

Your last answer was interpreted as follows: \(0 \)

Correct answer, well done.

\(\displaystyle z_1 =\) 5

Your last answer was interpreted as follows: \(5 \)

Correct answer, well done.

b) Determine o volume que ocupa o *espumante Terras do Demo* dentro desta taça (capacidade da taça) e a massa da base da taça sabendo que a sua densidade é \(\displaystyle \rho(x,y,z)={2}\)

Nota: por uma questão de simplificação dos cálculos para o cálculo do volume do espumante, considere que a espessura da taça é desprezável.

i) \(\displaystyle V(S)=V(S_2)+V(S_3)+V(S_4)\)

\(\displaystyle V(S_2) =\)

\(\displaystyle V(S_3)+V(S_4) =\)

ii) \(\displaystyle M(S_1) = \)

c) Defina \(S_2\) em coordenadas cilíndricas completando o conjunto seguinte:

\(\displaystyle S_2=\left \{ (\rho,\theta,z): \rho_1\leq \rho\le \rho_2\,\wedge \theta_1\leq \theta\leq \theta_2 \, \wedge \, z_1 \leq z \leq z_2 \right \}\)

\(\displaystyle \rho_1 =\) -2

Your last answer was interpreted as follows: \(-2 \)

Incorrect answer.

\(\displaystyle \rho_2 =\) 2

Your last answer was interpreted as follows: \(2 \)

Correct answer, well done.

\(\displaystyle \theta_1 =\) -1

Your last answer was interpreted as follows: \(-1 \)

Incorrect answer.

\(\displaystyle \theta_2 =\) 5.5

Your last answer was interpreted as follows: `5.5`

This answer is invalid. Your answer contains floating point numbers, that are not allowed here. You need to type in numbers as fractions. For example, you should type 1/3 not 0.3333, which is after all only an approximation to one third.

\(\displaystyle z_1 =\) -2

Your last answer was interpreted as follows: \(-2 \)

Incorrect answer.

\(\displaystyle z_2 =\) 2

Your last answer was interpreted as follows: \(2 \)

Incorrect answer.

A correct answer is \(2 \), which can be typed in as follows: `2`
A correct answer is \(2\cdot \pi \), which can be typed in as follows: `2*%pi`
A correct answer is \(\frac{2\cdot \pi}{3} \), which can be typed in as follows: `(2*%pi)/3`
A correct answer is \(y^2+x^2 \), which can be typed in as follows: `y^2+x^2`
A correct answer is \(1 \), which can be typed in as follows: `1`
A correct answer is \(2\cdot \pi \), which can be typed in as follows: `2*%pi`
A correct answer is \(4 \), which can be typed in as follows: `4`
A correct answer is \(2 \), which can be typed in as follows: `2`
A correct answer is \(0 \), which can be typed in as follows: `0`
A correct answer is \(5 \), which can be typed in as follows: `5`
A correct answer is \(8\cdot \pi \), which can be typed in as follows: `8*%pi`
A correct answer is \(3\cdot \pi \), which can be typed in as follows: `3*%pi`
A correct answer is \(\frac{16\cdot \pi}{3} \), which can be typed in as follows: `(16*%pi)/3`
A correct answer is \(0 \), which can be typed in as follows: `0`
A correct answer is \(2 \), which can be typed in as follows: `2`
A correct answer is \(0 \), which can be typed in as follows: `0`
A correct answer is \(2\cdot \pi \), which can be typed in as follows: `2*%pi`
A correct answer is \(\rho^2 \), which can be typed in as follows: `rho^2`
A correct answer is \(4 \), which can be typed in as follows: `4`

Pergunta 5

Não respondida

Nota: 3,000

Considere o PVI de ordem 2 definido por:

\(\displaystyle \left (\mathrm{P} \right)\left\{\begin{matrix}
y''-{4}y=0\\
y(0)=1\\
y'(0)=0
\end{matrix}\right. \)

a) Determine a solução particular de P.

\(\displaystyle y=y(t)\Leftrightarrow \)

b) Transforme o problema diferencial P num PVI de ordem 1, isto é, com um sistema de duas equações diferenciais de ordem 1.

\(\displaystyle \left (\mathrm{Q} \right) \left\{\begin{matrix} \left\{\begin{matrix} u'=f(t,u,v) \\ v'=g(t,u,v) \end{matrix}\right. \\u(0)=1 \\ v(0)=0
\end{matrix}\right. \)

\(\displaystyle f(t,u,v)=\)

\(\displaystyle g(t,u,v)=\)

A correct answer is \(y=\frac{e^{2\cdot t}}{2}+\frac{e^ {- 2\cdot t }}{2} \), which can be typed in as follows: `y = %e^(2*t)/2+%e^-(2*t)/2`

A correct answer is \(v \), which can be typed in as follows: `v`

A correct answer is \(4\cdot u \), which can be typed in as follows: `4*u`

« PREVIOUS ACTIVITY
Links para os exames de AM2 e Defesa de Trabalhos

NEXT ACTIVITY
Submissão de rascunhos e página de consulta permitida no exame da época normal »