

Quiz 5

B Term, 2013

Show all work needed to reach your answers.

High: 25
Median: 24
Low: 7

1. (10 points) If
- $f(x, y, z) = z(x^2y + \sin(x))$
- , . . .

(a) please find $\frac{\partial f}{\partial x}$

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$$\frac{\partial f}{\partial x} = z(2xy + \cos(x))$$

(b) if also $y = g(x)$ and $z = h(x)$, please find $\frac{df}{dx}$ in terms of $g'(x)$ and $h'(x)$

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$$= \frac{\partial f}{\partial x} + \frac{\partial f}{\partial y} \frac{dy}{dx} + \frac{\partial f}{\partial z} \frac{dz}{dx} \leftarrow \text{General Answer}$$

$$= z(2xy + \cos x) + g'(x)zx^2 + h'(x)(x^2y + \sin x) \leftarrow \text{Better}$$

$$\frac{df}{dx} = h(x)[2xg(x) + x^2g'(x) + \cos x] + h'(x)[x^2g(x) + \sin x] \leftarrow \text{Best Everything in terms of } x$$

2. (15 points) Please set up the iterated integral
- $\iint f(x, y) dx dy$
- for each of the following:

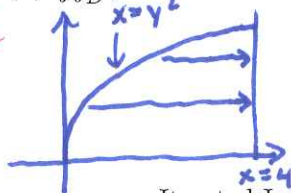
(a) The volume that is under the surface $z = f(x, y) = 2 - x^2 - y^2$ and above the rectangle $R = [0, 1] \times [0, 1]$.

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Iterated Integral: $\int_0^1 \int_0^1 (2 - x^2 - y^2) dx dy$

(b) $\iint_D f$ where D is the region between the curves $y = \sqrt{x}$, $y = 0$ and $x = 4$.

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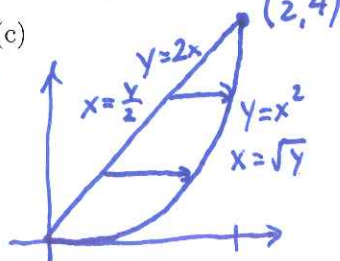


Iterated Integral:

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

(-1) If $\int_{y^2}^4$ is the inner integral.

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Iterated Integral:

$$\int_0^2 \int_{x^2}^{2x} (2x + 3) dy dx$$

$$\int_0^4 \left(\int_{y/2}^{\sqrt{y}} (2x + 3) dx \right) dy$$

(-1) If $\int_{y/2}^{\sqrt{y}}$ is the inner integral.