Name: ———————————————————————————

There are 20 points possible on this quiz. This is a closed book quiz and closed note quiz. Calculators are not allowed. If you have any questions, please raise your hand.

1. Evaluate the iterated integral $\int_0^1 \int_0^{e^x} \sqrt{1 + 3e^x}\, dy\, dx$ ✱

$$= \int_0^1 (1+3e^x)^{1/2} \cdot y \Big]_{y=0}^{y=e^x} dx = \int_0^1 e^x (1+3e^x)^{1/2} dx = \frac{2}{9}(1+3e^x)^{3/2} \Big]_0^1$$

$$= \frac{2}{9}\left((1+3e)^{3/2} - (4)^{3/2} \right) = \frac{2}{9}\left[(1+3e)^{3/2} - 8 \right]$$

✱ mini check: take derivative $\dfrac{2}{9} \cdot \dfrac{3}{2}(1+3e^x)^{1/2} (3) e^x$

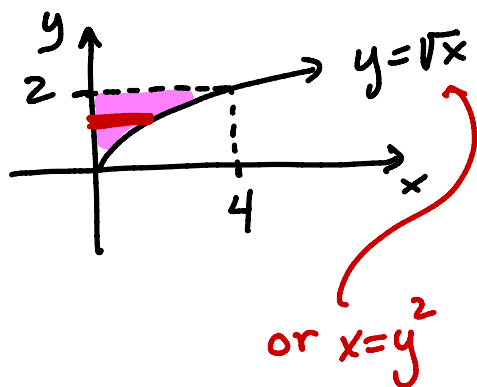2. Evaluate the double integral $\iint_D e^{-x^2}\, dA$ where $d = \{(x,y)\,|\,0 \le x \le 3,\ 0 \le y \le x\}$.

$$= \int_0^3 \int_0^x e^{-x^2}\, dy\, dx = \int_0^3 y e^{-x^2} \Big]_{y=0}^{y=x} dx$$

$$= \int_0^3 x e^{-x^2}\, dx = -\frac{1}{2} e^{-x^2} \Big]_0^3 = -\frac{1}{2}\left(e^{-9} - 1 \right)$$

✱ mini-check; $-\frac{1}{2} \cdot (-2x) \cdot e^{-x^2}$ ✓

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3. Sketch the region of integration and then reverse the order of integration for the integral $\int_0^4 \int_{\sqrt{x}}^2 \sqrt{y^2+1}\, dy\, dx$. [NOTE: You do not need to evaluate the integral.]

$\sqrt{x} \le y \le 2, \quad 0 \le x \le 4$

$y = \sqrt{x}$

or $x = y^2$

$$\int_0^2 \int_0^{y^2} \left(y^2+1\right) dx\, dy$$

4. **Set up** the iterated integral to find volume of the solid under the surface $z = 2 + x^2 + \sin(y)$ and above the region bounded by the parabolas $y = x^2$ and $x = y^2$. [NOTE: You do not need to evaluate the integral.]

$y = x^2$

$x = y^2$
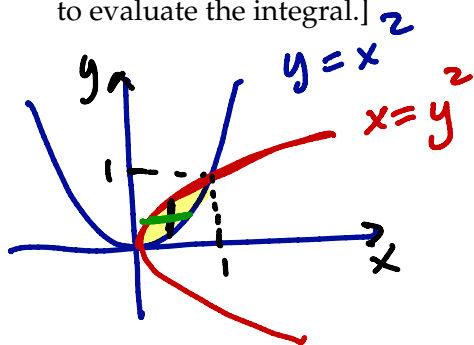
$$\int_0^1 \int_{x^2}^{\sqrt{x}} \left(2 + x^2 + \sin y\right) dy\, dx$$

or

$$\int_0^1 \int_{\sqrt{y}}^{y^2} \left(2x^2 + \sin y\right) dx\, dy$$