Quiz 9
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Quiz 9

a) $\int_1^{\infty} \frac{e^{-\sqrt{x}}}{\sqrt{x}}\, dx$

2) $x = \frac{y^4}{8} + \frac{1}{4y^2} \quad 1 \leq y \leq 2$

1) $= \int_1^{\infty} \frac{e^{-\sqrt{x}}}{\sqrt{x}}\, dx \quad \int_a^b \frac{e^{-\sqrt{x}}}{\sqrt{x}}\, dx$

$u = \sqrt{x} \qquad du = \frac{1}{2\sqrt{x}}\, dx$

$x = a$
$u = \sqrt{a} \qquad x = b$
$u = \sqrt{b}$

$$\int_{\sqrt{a}}^{\sqrt{b}} \frac{e^{-\sqrt{x}}}{\sqrt{x}} (2\sqrt{x})\,du =$$

$$2\int_{\sqrt{a}}^{\sqrt{b}} e^{-u}\,du = -2e^{-u}\Big|_{\sqrt{a}}^{\sqrt{b}} =$$

$a=1 \quad b=\infty$

$$-2e^{-\sqrt{b}} + 2e^{-\sqrt{a}} = -2e^{-\sqrt{b}} + 2e^{-1} =$$

$$-2e^{-\sqrt{b}} + \frac{2}{e}$$

$$\lim_{b\to\infty} -2e^{-\sqrt{b}} + \frac{2}{e} = \frac{2}{e} - 2\lim_{b\to\infty} \cancel{\frac{1}{e^{\sqrt{b}}}}^{\,0}$$

$$\boxed{\int_1^{\infty} \frac{e^{-\sqrt{x}}}{\sqrt{x}}\,dx = \frac{2}{e}}$$

Problema 2

a) $x = \frac{y^4}{8} + \frac{1}{4y^2} \quad 1 \leq y \leq 2$

$x = \frac{y^4}{8} + \frac{y^{-2}}{4}$

$l = \int_0^b \sqrt{1 + \left(\frac{dx}{dy}\right)^2} dy = \int_1^2 \sqrt{1 + \left(\frac{dx}{dy}\right)^2} dy$

$\frac{dx}{dy} = \frac{y^3}{2} - \frac{1}{2y^3}$

$\left(\frac{dx}{dy}\right)^2 = \left(\frac{y^3}{2} - \frac{1}{2y^3}\right)^2 = \frac{y^6}{4} - \frac{1}{2} + \frac{1}{4y^6}$

$L = \int_1^2 \sqrt{1 + (\frac{y^6}{4} - \frac{1}{2} + \frac{1}{4y^6}} dy =$

$\int_1^2 \sqrt{\frac{y^6}{4} + \frac{1}{2} + \frac{1}{4y^6}} dy =$

$$\int_1^2 \sqrt{\left(\frac{y^3}{2}+\frac{1}{2y^3}\right)^2}\,dy =$$

$$\int_1^2 \frac{y^3}{2}+\frac{1}{2y^3}\,dy = \frac{y^4}{8} - \frac{1}{4y^2}\Big|_1^2$$

$$\frac{2^4}{8} - \frac{1}{4\cdot 2^2} - \frac{1}{8} + \frac{1}{4} =$$

$$2 - \frac{1}{16} - \frac{1}{8} + \frac{1}{4} = \boxed{\frac{33}{16}}$$

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