SOLUCIÓN DEL EXAMEN II

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1) $L=\int_0^1 \sqrt{(8t)^2+(4t)^2}dx=2\sqrt{5}$ solucion (e)

2) $\frac{dy}{dt}+ty=y,\ y(0)=e$

$\frac{dy}{dt}=y\,(1-t)$ $\frac{dy}{y}=(1-t)\,dt$ $\int\frac{dy}{y}=\int(1-t)\,dt$ $\ln y=t-\frac{1}{2}t^2+C$ $C=1$

$e^{\ln y}=e^{t-\frac{1}{2}t^2+1}$ $y=e^{t-\frac{1}{2}t^2+1}$

solucion es (d)

3) $\frac{1}{9-0}\int_0^9\sqrt{x}dx=2$ solucion es (c)

4) $\frac{dy}{dt}=te^{-y}$ $e^y dy=tdt$ $\int e^y dy=\int tdt$ $e^y=\frac{t^2}{2}+c$

$y=\ln(\frac{t^2}{2}+1)$
La solucion es (e)

5) $80=kx$ $80=k\left(\frac{1}{20}\right)$ $k=1600$ $\int_{.10}^{.15}1600xdx=10J$

La solucion es (a)

Parte II
6)
a) $\int(1+x)\,e^x dx=e^x x+c$

b) $\int\frac{(\ln x)^2}{x}dx=\frac{1}{3}(\ln x)^3+C$

7) $y=2^x-1$
$y=3\sin(\frac{\pi x}{4})$ para $x\geq 0$

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$A = \int_0^2 \left(3\sin\left(\frac{\pi x}{4}\right) - (2^x - 1)\right) dx = \frac{-3\pi + 2\pi \ln 2 + 12 \ln 2}{\pi \ln 2} = 1.4916$

8)
$y = x^2 \quad y = \sqrt{x}$
$A_1 = \pi \left(\sqrt{x}\right)^2 = \pi x$
$A_2 = \pi \left(x^2\right)^2 = \pi x^4$
$V = \int_0^1 \left(\pi x - \pi x^4\right) dx = \frac{3}{10}\pi$

9) $A = \int_0^9 \sqrt{x} dx = 18$
$\overline{x} = \frac{1}{A} \int x f(x) dx = \frac{1}{18} \int_0^9 x\sqrt{x} dx = \frac{27}{5}$

$\overline{y} = \frac{1}{A} \int \frac{1}{2} \left[f(x)\right]^2 dx = \frac{1}{18} \int_0^9 \frac{1}{2} \left(\sqrt{x}\right)^2 dx = \frac{9}{8}$
$\left(\frac{27}{5}, \frac{9}{8}\right)$

10) $\frac{r}{17-x} = \frac{6}{17} \qquad r = \frac{6}{17}(17 - x)$
$A_i = \pi r^2 = \pi \left(\frac{6}{17}(17 - x_i)\right)^2 = \pi \left(6 - \frac{6}{17} x_i\right)^2$
$V_i = \pi \left(6 - \frac{6}{17} x_i\right)^2 \Delta x$
$M_i = (1000)\pi \left(6 - \frac{6}{17} x_i\right)^2 \Delta x = 1000\pi \left(6 - \frac{6}{17} x_i\right)^2 \Delta x$
$F_i = (9.8)\, 1000\pi \left(6 - \frac{6}{17} x_i\right)^2 \Delta x = 9800\pi \left(6 - \frac{6}{17} x_i\right)^2 \Delta x$
$W_i = (x_i)\, 9800\pi \left(6 - \frac{6}{17} x_i\right)^2 \Delta x = 9800 x_i \pi \left(6 - \frac{6}{17} x_i\right)^2 \Delta x$

$W = \int_7^{17} 9800 x\pi \left(6 - \frac{6}{17} x\right)^2 dx = \frac{11172\,00000}{289}\pi = 1.2145 \times 10^7$