Laboratorio # 1

29/07/2019

20190432
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100 pts *

① a) $\int (\sqrt{x}+2)(\sqrt{x}-2)(x+4)\,dx$

$\int (x-4)(x+4)\,dx$

$\int (x^2-16)\,dx$

$\int x^2\,dx - \int 16\,dx$

$\frac{x^{2+1}}{2+1} - 16x = \frac{x^3}{3} - 16x + C$

6pts

b) $\int \frac{3x^{3/2}+x+3\sqrt{x}}{x^2}\,dx$

$\int \frac{3x^{3/2}}{x^2} + \frac{x}{x^2} + \frac{3(x)^{1/2}}{x^2}\,dx$

$\frac{3}{2}-\frac{4}{2}=-\frac{1}{2}$

$\int \left[3x^{-1/2} + \frac{1}{x} + 3x^{-3/2}\right] dx$

$\left\{3\int x^{-1/2}\,dx\right\} + \left\{\int x^{-1}\,dx\right\} + \left\{3\int x^{-3/2}\,dx\right\}$

$\frac{3\cdot x^{1/2}}{1/2} + \frac{x^2}{2} + \frac{3\cdot x^{-1/2}}{-1/2} = 6\sqrt{x} + \ln(x) - 6x^{-1/2} + C$

6pts

c) $\int \left(e^{\pi}\sin(x) + \tan(5)\sinh(x) - 5\cdot\pi^{x}\right) dx$

$= \left\{e^{\pi}\int \sin(x)\,dx\right\} + \left\{\tan(5)\int \sinh(x)\,dx\right\} - \left\{5\int \pi^{x}\,dx\right\}$ $\cos x \overset{?}{=} -\sin x$, $\sin x = \cos x$

$= -e^{\pi}\cos(x) + \tan(5)\cosh(x) - 5\cdot\frac{\pi^{x}}{\ln(\pi)} + C$

6pts

7

d) $\int_{1/2}^{1} \frac{4u + u^{2}}{u^{4}}\,du$

$= \int_{1/2}^{1} \frac{4u}{u^{4}} + \frac{u^{2}}{u^{4}}\,du$

$= \int_{1/2}^{1} \frac{4u}{u^{4}}\,du + \int \frac{u^{2}}{u^{4}}\,du$ $\quad \frac{1}{u^{2}} = \frac{u^{-2+1}}{-1} = \frac{u^{-1}}{-1}\Big]_{1/2}^{1} = -\frac{1}{u} = \left[-\frac{1}{(1)^{2}} - \left(-\frac{1}{(1/2)^{2}}\right)\right]$

6pts

$= 4 * u^{-3}\Big]_{1/2}^{1} + u^{-2}\Big]_{1/2}^{1} =$

7

$+ \cancel{(1/3)\ldots} = 3$

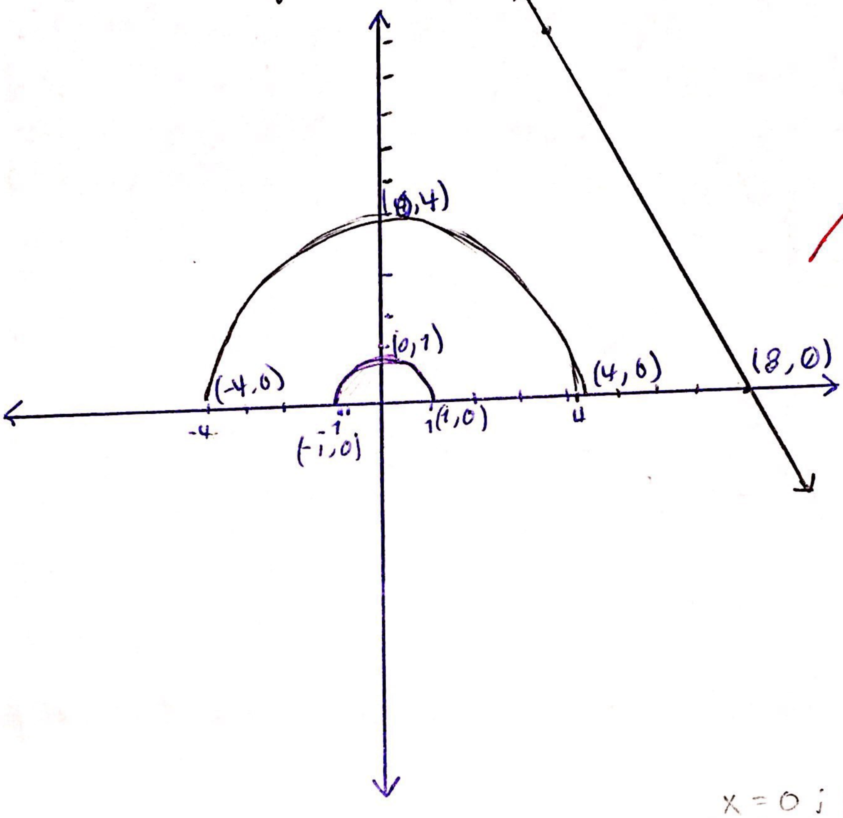
$= \frac{4u^{-2}}{-2}\Big]_{1/2}^{1} \overbrace{\left\{\left(\frac{4}{(1)^{2}\cdot -2}\right) - \left(\frac{4}{(1/4)\cdot -2}\right)\right\}}^{6} + \underbrace{\left\{\cancel{\left(\frac{1}{(1)^{2}}\right) - \left(\frac{1}{(1/2)^{2}}\right)}\right\}}_{1}$

$\left(\frac{4}{-2}\right) - \left(\frac{4}{\frac{1}{4}\cdot\frac{-2}{1}}\right)$

$(-2) - \left(\frac{\frac{4}{1}}{\frac{-2}{4}}\right) = -2 - \left(\frac{8}{-2}\right) = -2 + \frac{8}{2}$

2.) $\int_{-1}^{0}\sqrt{1-x^2}\,dx + \int_{0}^{4}\sqrt{16-x^2}\,dx + \int_{6}^{8}(16-2x)\,dx$

ⓐ Realizar la gráfica indicando interceptos



15pts

$y=0 \;;\; x=0$

$\sqrt{1-x^2} = y$

$\sqrt{1-0} = y$

$\pm 1 = y$

$\sqrt{1-x^2} = 0$

$1-x^2 = 0$

$-x^2 = -1$

$x = \sqrt{1}$

$x = \pm 1$

$y=0 \;;\; x=0$

$\sqrt{16-x^2} = y$

$\sqrt{16-0^2} = y$

$\pm 4 = y$

$\sqrt{16-x^2} = 0$

$16-x^2 = 0$

$-x^2 = -16$

$x = \sqrt{16}$

$x = \pm 4$

$x=0 \;;\; y=0$

$16-2x = y$

$16 = y$

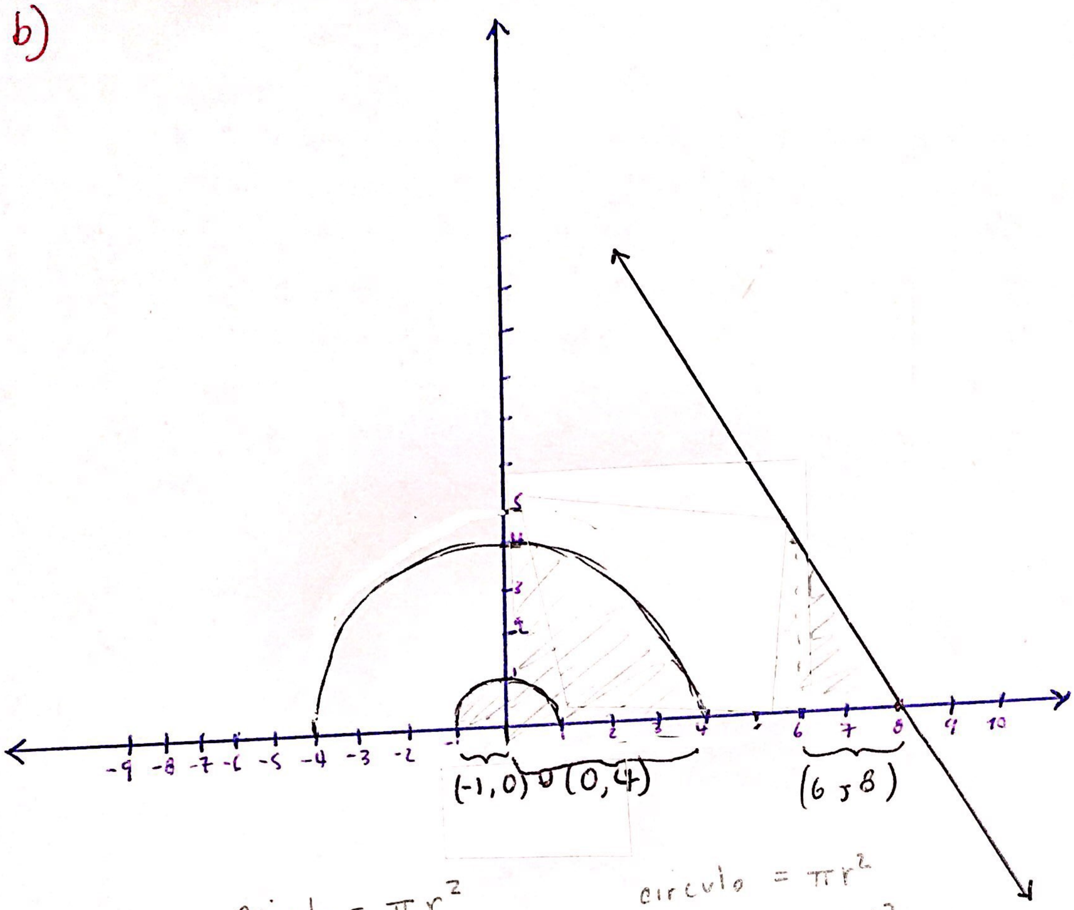
$16-2x = 0$

$-2x = -16$

$x = \frac{-16}{-2}$

$x = 8$

b)



circulo $= \pi r^2$

$AC = \pi(-1)^2$

$A.C. = \pi$

$AC_1 = \frac{1}{4}\pi$

circulo $= \pi r^2$

$AC_2 = \frac{1}{4}\pi(4)^2$

$AC_2 = \frac{16}{4}\pi$

$AC_2 = 4\pi$

triángulo

$T = \frac{1}{2}bh$

$T = \frac{1}{2}(2)(4)$

$T = \frac{8}{2}$

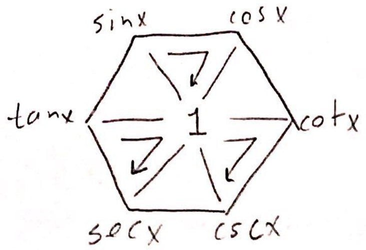
$T = 4$

$\frac{1}{4}\pi + 4\pi + 4$

10pts

e) $$\int_0^{\pi/4} \frac{\sec\theta \cot\theta}{\sin\theta}\, d\theta$$

$\theta = x$



$$\frac{\frac{1}{\cancel{\cos\theta}}\cdot\frac{\cancel{\cos\theta}}{\sin\theta}}{\sin\theta} = \left[\frac{\frac{1}{\sin\theta}}{\frac{\sin\theta}{1}}\right] = \frac{1}{\sin^2\theta} = \csc^2\theta$$

$$\int_0^{\pi/4} \csc^2\theta\, d\theta = -\cot\theta\Big]_0^{\pi/4}$$

$[-\cot(\pi/4)] - [-\cot(0)]$ = indefinida

8pts

f) $$\int_{\pi/4}^{\pi/2} \sec t\,(\sec(t) + \tan(t))\, dt$$

$$\int (\sec^2 t)\,dt + \int (\sec t \cdot \tan t)\, dt$$

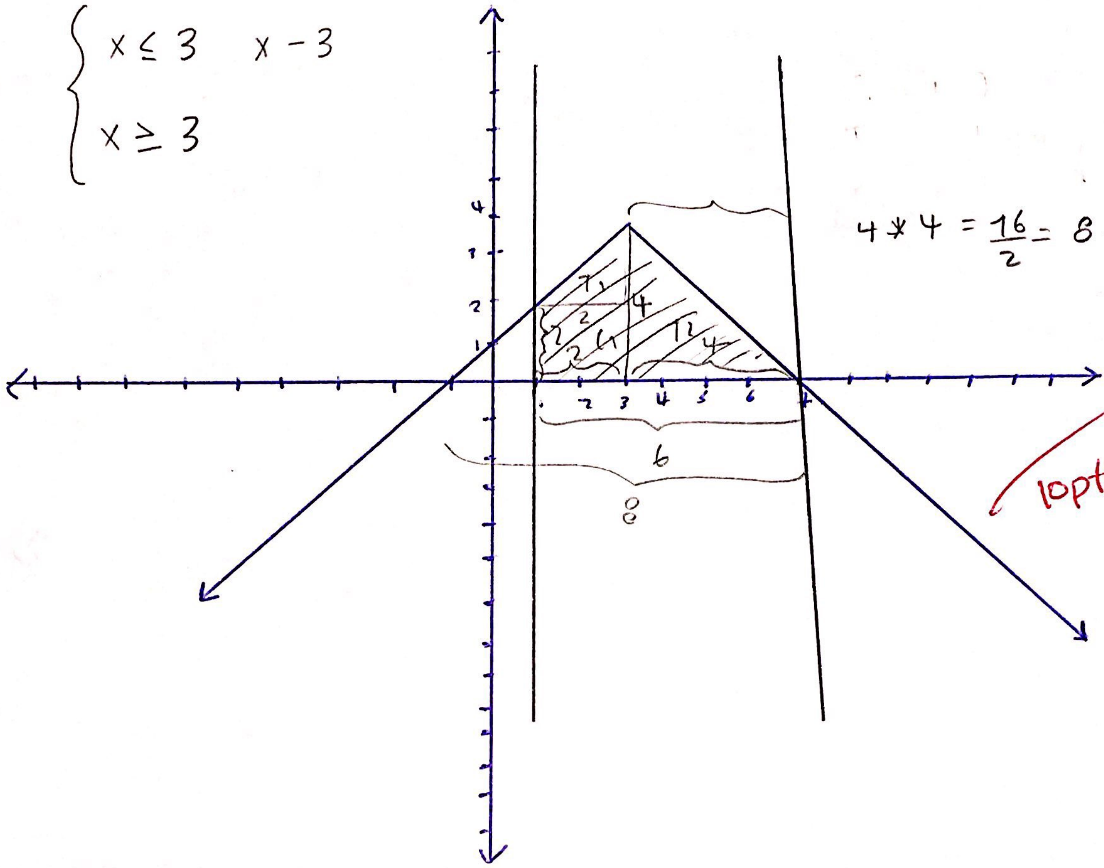
$$(\tan(t)) + (\sec t)\Big]_{\pi/4}^{\pi/2}$$

$$\underbrace{\left[\frac{\sin(\pi/2)}{\cos(\pi/2)} + \frac{1}{\cos(\pi/2)}\right]}_{\text{indefinida}} - \left[\frac{\sin(\pi/4)}{\cos(\pi/4)} + \frac{1}{\cos(\pi/4)}\right] = \text{indefinida}$$

8pts

③ $f(x) = 4 - |x - 3|$; $x = 1$ & $x = 7$

$$|x-3| = \begin{cases} x \le 3 & x - 3 \\ x \ge 3 & \end{cases}$$



$4 * 4 = \frac{16}{2} = 8 * 2 = \frac{16}{\cancel{2}} - 2 =$

100pts

10pts

$f(x) = 4 - (-x + 3)$ $\quad$ $f(x) = 4 - (x - 3)$

$4 + x - 3$ $\quad$ $4 - x + 3$

$f(x) = \int (x + 1)\,dx$ $\quad$ $f(x) = \int (-x + 7)\,dx$

$\int x\,dx + \int 1\,dx$ $\quad$ $\int -x\,dx + \int 7$

$$-\frac{x^2}{2} + 7x \Big]_3^7 = -\frac{7^2}{2} + 7(7) - \left[-\frac{3^2}{2} + 3(3)\right]$$

$$\frac{x^2}{2} + x \Big]_1^3 = \left[\frac{3^2}{2} + 3\right] - \left[\frac{1^2}{2} + 1\right] = \frac{9}{2} + 3 - \frac{1}{2} - 1$$

15pts

$$\frac{9}{2} - \frac{1}{2} = \frac{8}{2} = 4 + 2 = 6$$

$$\int_1^3 (x + 1)\,dx = 6$$

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