Elda Sarahi Del Rio Santillan **Final ePortfolio**

A01570233 **Calculus II**

8. Quiz 2 Third Partial (with corrections)

CALCULUS II

QUIZ 2 B 3RD PARTIAL

100 excellent!! +3

Name Elda Sarahi Del Rio Santillan, Karen Orea ID A01570233 DATE: April 20th, 2018

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (12.5 pts each one)

Evaluate the integral.

1) $\int 4xe^x\,dx$ — 1) A

A) $4xe^x - 4e^x + C$ B) $xe^x - 4e^x + C$ C) $4e^x - e^x + C$ D) $4e^x - 4xe^x + C$

2) $\int e^{5x}\cos 4x\,dx$ — 2) anidada

A) $\frac{e^{5x}}{2}[\sin 4x + \cos 4x] + C$ B) $\frac{1}{41}[4e^{5x}\sin 4x + 5\cos 4x] + C$

C) $\frac{e^{5x}}{41}[4\sin 4x + 5\cos 4x] + C$ D) $\frac{e^{5x}}{41}[4\sin 4x - 5\cos 4x] + C$

3) $\int (2x-1)\ln(24x)\,dx$ — 3) A

A) $(x^2 - x)\ln 24x - \frac{x^2}{2} + x + C$ B) $(x^2 - x)\ln 24x - \frac{x^2}{2} + 2x + C$

C) $\left(\frac{x^2}{2} - x\right)\ln 24x - \frac{x^2}{4} + x + C$ D) $(x^2 - x)\ln 24x - x^2 + x + C$

4) $\int 23x\cos\frac{1}{2}x\,dx$ — 4) B

A) $23x\sin\left(\frac{1}{2}\right)x - 46\cos\left(\frac{1}{2}\right)x + C$ B) $46x\sin\left(\frac{1}{2}\right)x + 92\cos\left(\frac{1}{2}\right)x + C$

C) $92\sin\left(\frac{1}{2}\right)x - 46x\cos\left(\frac{1}{2}\right)x + C$ D) $23\sin\left(\frac{1}{2}\right)x + 46x\cos\left(\frac{1}{2}\right)x + C$

5) $\int e^{2x}x^2\,dx$ — 5) B

A) $(1/2)x^2e^{2x} - (1/4)xe^{2x} + (1/4)e^{2x} + C$ B) $(1/2)x^2e^{2x} - (1/2)xe^{2x} + (1/4)e^{2x} + C$

C) $(1/2)x^2e^{2x} - (1/2)xe^{2x} + C$ D) $(1/2)x^2e^{2x} - xe^{2x} + (1/4)e^{2x} + C$

LATE

① $\int 4x\,e^x\,dx$

sign	+	−
+	$4x$	e^x
−	4	e^x
+	0	e^x

$= \boxed{4xe^x - 4e^x + C}$

② $\int e^{5x}\cos 4x\,dx$

exp · trigonometric

anidada

③ $\int (2x-1)\ln(24x)\,dx$ $\quad uv - \int v\,du$

$u = \ln(24x)$ $\quad dv = (2x-1)$

$du = \frac{24}{24x} \to \frac{1}{x}dx$ $\quad v = x^2 - x$

$\to \ln(24x)\cdot(x^2-x) - \int (x^2-x)\cdot\frac{1}{x}$

$\frac{(x^2-x)}{x} = \int (x-1)$

$\frac{x^2}{2} - x$

$\boxed{\to (x^2-x)\ln(24x) - \frac{x^2}{2} + x + C}$

sign	u	dv
+	x^3	$\cos(3x)$
−	$3x^2$	$\frac{1}{3}\sin(3x)$
+	$6x$	$-\frac{1}{9}\cos(3x)$
−	6	$-\frac{1}{27}\sin(3x)$
+	0	$\frac{1}{81}\cos(3x)$

$u' = 3$

$u = x^3$

$dv = \cos 3x$

$\Rightarrow = \frac{1}{3}x^3\sin(3x) + \frac{1}{3}x^2\cos(3x) - \frac{2}{9}x\sin(3x) - \frac{2}{27}\cos(3x)$

✓ 6) $\int x^3 \cos 3x \, dx$

A) $\frac{1}{3}x^3 \sin 3x - \frac{1}{3}x^2 \cos 3x + \frac{2}{9}x \sin 3x + \frac{2}{27}\cos 3x + C$

B) $\frac{1}{3}x^3 \sin 3x + 1x^2 \cos 3x - 2x \sin 3x - 2\cos 3x + C$

C) $\frac{1}{3}x^3 \sin 3x + \frac{1}{3}x^2 \cos 3x - \frac{2}{9}x \sin 3x - \frac{2}{27}\cos 3x + C$

D) $\frac{1}{3}x^3 \cos 3x + \frac{1}{3}x^2 \sin 3x - \frac{2}{9}x \cos 3x - \frac{2}{27}\sin 3x + C$

6) C

✓ 7) $\int_0^4 x^4 \ln 9x \, dx$

A) 774.86 B) -201.22 C) 699.77 D) 692.94

7) D

✓ 8) $\int (x^2 - 3x)e^x \, dx$

A) $e^x[x^2 - 5x + 5] + C$

B) $e^x[x^2 - 5x - 5] + C$

C) $e^x[x^2 - 3x + 3] + C$

D) $\frac{1}{3}x^3e^x - \frac{3}{2}x^2e^x + C$

8) A

(4) $\int 23x \cos\left(\frac{1}{2}x\right) dx$

$u = 23x$

$dv = \cos\left(\frac{1}{2}x\right) dx$

sign	u	dv
+	$23x$	$\cos(\frac{1}{2}x)$
−	23	$2\sin(\frac{1}{2}x)$
+	0	$-4\cos(\frac{1}{2}x)$

$u' = \frac{1}{2}$

$\Rightarrow 46x\sin\left(\frac{1}{2}x\right) + 92\cos\left(\frac{1}{2}x\right) + C$

(5) $\int e^{2x} x^2 \, dx$

$u = x^2$

$dv = e^{2x}$

sign	u	dv
+	x^2	e^{2x}
−	$2x$	$\frac{1}{2}e^{2x}$
+	2	$\frac{1}{4}e^{2x}$
−	0	$\frac{1}{8}e^{2x}$

$u' = 2$

$\Rightarrow \frac{1x^2}{2}e^{2x} - \frac{1}{2}xe^{2x} + \frac{1}{4}e^{2x} + C$

$\left(\frac{1}{2}\right)x^2e^{2x} - \left[\frac{1}{2}\right]xe^{2x} + \frac{1}{4}e^{2x} + C$

7) $\int_0^4 x^4 \ln 9x \, dx$

$u = \ln(9x)$ $dv = x^4$

$du = \frac{9}{9x} \Rightarrow \frac{1}{x}dx$ $v = \frac{x^5}{5}$

$uv - \int v\,du$

$\frac{x^5}{5} \cdot \ln(9x) - \int \frac{x^5}{5} \cdot \frac{1}{x} \Rightarrow \frac{x^5}{5x} \Rightarrow \int \frac{x^4}{5} \Rightarrow -\frac{1}{5}\int x^4 \Rightarrow -\frac{1}{5}\left|\frac{x^5}{5}\right.$

$\frac{x^5}{5} \cdot \ln(9x) - \frac{x^5}{25} \Rightarrow \frac{(4)^5}{5} \cdot \ln|9(4)| - \frac{(4)^5}{25} = 692.94$

$\frac{(0)^5}{5}(\ln|9(0)|) - \frac{0^5}{25} = \text{ERROR}$

sign	u	dv
+	$(x^2 - 3x)$	e^x
−	$2x - 3$	e^x
+	2	e^x

$x^2 - 3x - 2x + 3 + 2$

$x^2 - 5x + 5$

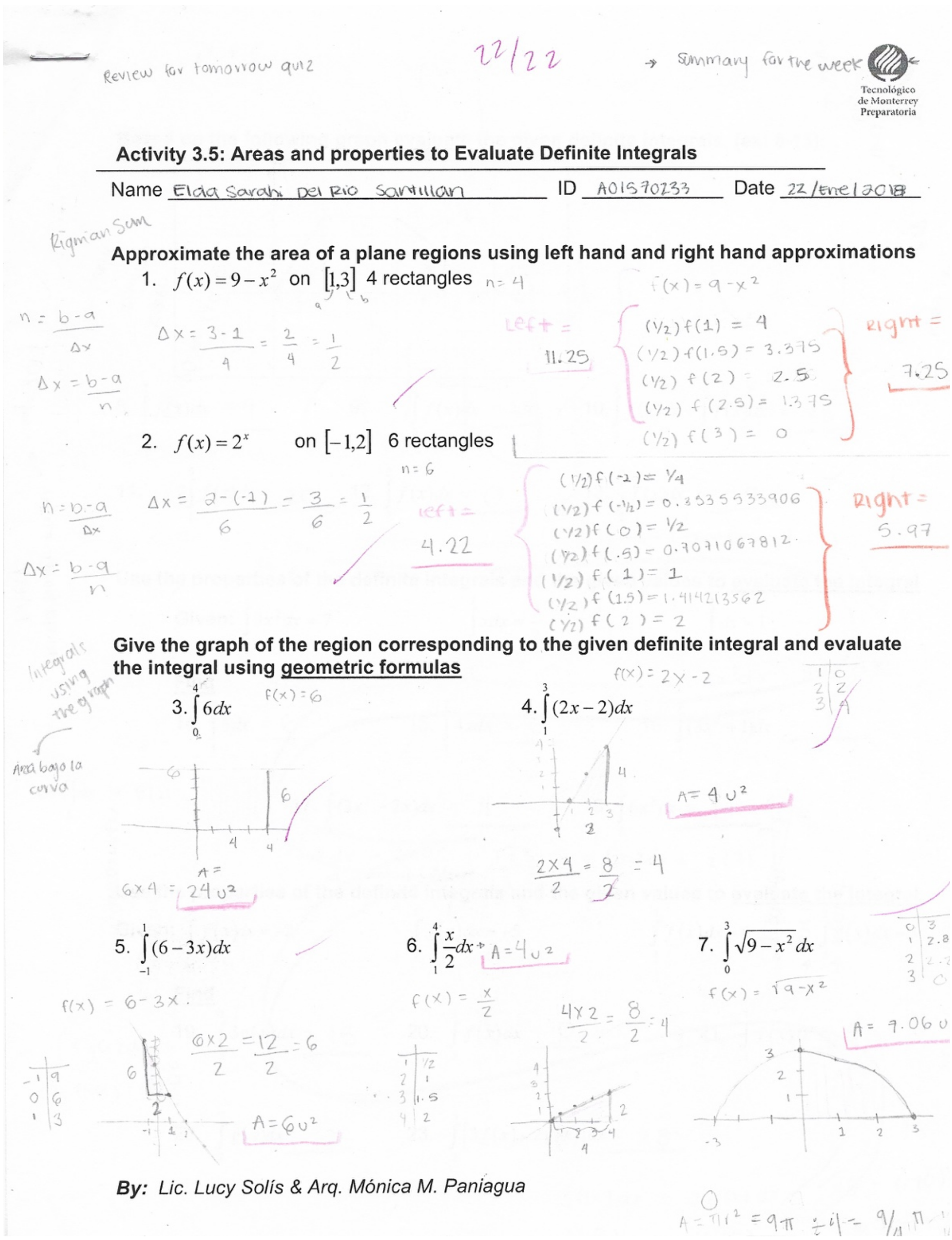
$(x^2 - 3x)e^x - (2x - 3)e^x + 2e^x + C \Rightarrow e^x[(x^2 - 3x) - (2x - 3) + 2] + C$

Corrections Quiz 2 Third Partial → No corrections needed

9. Significant Activity 1 First Partial:

Activity 3.5: Areas and properties to Evaluate Definite Integrals

It is significant because when we saw that topic I was confused because I knew it was a quiet easy but at the moment I was answering I get confused with the specific place the values should take. In the realization of this activity I realized how the problems need to be solve and how it relates with the others themes.



Review for tomorrow quiz 22/22 → Summary for the week

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Activity 3.5: Areas and properties to Evaluate Definite Integrals

Name Elda Sarahi Del Rio Santillan ID A01570233 Date 22/Ene/2018

Rigman Sum

Approximate the area of a plane regions using left hand and right hand approximations

1. $f(x)=9-x^2$ on $[1,3]$ 4 rectangles $n=4$

$n=\frac{b-a}{\Delta x}$ $\Delta x=\frac{b-a}{n}$

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

$f(x)=9-x^2$

left = 11.25

$(1/2)f(1)=4$
$(1/2)f(1.5)=3.375$
$(1/2)f(2)=2.5$
$(1/2)f(2.5)=1.375$
$(1/2)f(3)=0$

right = 7.25

2. $f(x)=2^x$ on $[-1,2]$ 6 rectangles $n=6$

$\Delta x=\frac{2-(-1)}{6}=\frac{3}{6}=\frac{1}{2}$

left = 4.22

$(1/2)f(-1)=1/4$
$(1/2)f(-1/2)=0.3535533906$
$(1/2)f(0)=1/2$
$(1/2)f(.5)=0.7071067812$
$(1/2)f(1)=1$
$(1/2)f(1.5)=1.414213562$
$(1/2)f(2)=2$

Right = 5.97

Give the graph of the region corresponding to the given definite integral and evaluate the integral using geometric formulas

Integrals using the graph — Area bajo la curva

3. $\int_0^4 6dx$ $f(x)=6$

$A = 6\times 4 = 24u^2$

4. $\int_1^3 (2x-2)dx$ $f(x)=2x-2$

$\frac{2\times 4}{2}=\frac{8}{2}=4$ $A=4u^2$

5. $\int_{-1}^1 (6-3x)dx$ $f(x)=6-3x$

$\frac{6\times 2}{2}=\frac{12}{2}=6$ $A=6u^2$

6. $\int_1^4 \frac{x}{2}dx$ $A=4u^2$ $f(x)=\frac{x}{2}$

$\frac{4\times 2}{2}=\frac{8}{2}=4$

7. $\int_0^3 \sqrt{9-x^2}\,dx$ $f(x)=\sqrt{9-x^2}$

$A=7.06u$

$A=\pi r^2=9\pi \div 4=9/4\,\pi$

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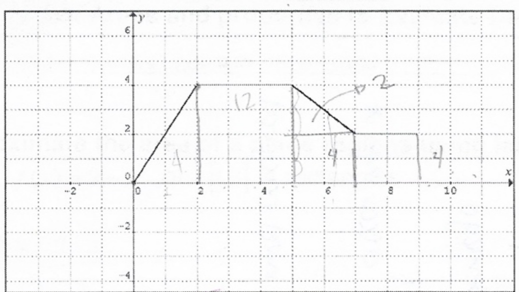
Based on the following graph <u>evaluate</u> the given definite integrals (ex: 8-13):



8. $\int_0^2 f(x)dx = 4$

9. $\int_0^5 f(x)dx = 16$ (12) + 4

10. $\int_2^5 f(x)dx + \int_5^7 f(x)dx = 18$ 12 4 6

11. $2\int_5^9 f(x)dx = 20$

12. $\int_2^2 f(x)dx = 0$

13. $\int_2^0 f(x)dx = -4$ $-\int_0^2 f(x)dx = 4 \times (-)$

Use the properties of the definite integrals and the given values to <u>evaluate the integral</u>

Given: $\int_1^2 3x^2 dx = 7$ $\int_1^2 x dx = \frac{3}{2}$ $\int_1^2 dx = 1$

<u>Find</u>

14. $\int_1^2 6dx = 6$ $6\int_1^2 dx = 6(1)$

15. $\int_1^2 4x dx = 6$ $\frac{3}{2}(4)$

16. $\int_1^2 (3x^2 + 1)dx = 8$ $3x^2dx + dx$

17. $\int_1^2 (3x^2 - 2x)dx = 4$ $\int_1^2 3x^2 dx - 2x\,dx$ $7 - 2(3/2) = 3$ $7 - 3$

18. $\int_2^1 6x^2 dx = 14$ $2\int_2^1 3x^2 dx = 2(7)$

Use the properties of the definite integrals and the given values to <u>evaluate the integral</u>

Given: $\int_1^2 f(x)dx = -2$ $\int_2^5 g(x)dx = -5$ $\int_2^5 f(x)dx = 6$ $\int_5^7 g(x)dx = 3$

<u>Find</u>

19. $\int_5^2 3g(x)dx = 15$ $-\int_2^5 3g(x)dx$ $-3(-5) = +15$

20. $\int_3^3 f(x)dx = 0$

21. $\int_1^7 f(x)dx = 4$

22. $\int_2^7 g(x)dx = -2$

23. $\int_2^5 [3f(x) - 2g(x)]dx = 28$ $3f(x)dx - 2g(x)dx$ $3(6) - 2(-5)$ $18 - (-10)$ $18 + 20 = 28$

By: *Lic. Lucy Solís & Arq. Mónica M. Paniagua*

10. Significant Activity 2 Second Partial

Activity 4.5: Volumes of solids of revolution

This activity is significant because since the teacher were explaining, I totally understand how it works. Instead, I like the whole stuff of calculating areas volumes. I really enjoy that class because the explanation was pretty conscious. It was difficult, but now I can solve it without any trouble.

Derivadas e integrales - Hoy en la industria

13/16

NOG) pq es volumen

Todas giran eje x : en esta actividad

→ No están huecas

→ figura sólidas

Aquel concepto en el que funcionan las impresiones 3D.

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Activity 4.5: Volumes of solids of revolution

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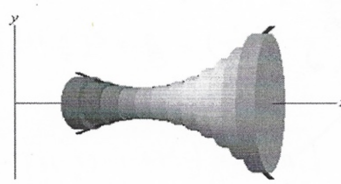
Use https://www.geogebra.org/student/mJ6zfMMCV **to visualize the formation of the volume**

To find the volume use	$V=\int_a^b \pi\left[f(x)\right]^2 dx$ $V=\pi\int_a^b \left[f(x)\right]^2 dx$



Source: http://tutorial.math.lamar.edu/Classes/Calcl/Area_Volume_Formulas.aspx Retrieved on July 4, 2016

Find the volume generated by revolving the given function around the x axis, between x = a and x = b

1) $y=\sqrt{2x-1}$ between $x=\frac{1}{2}$ and $x=3$

$\pi\int_{1/2}^{3}(\sqrt{2x-1})^2 dx = \pi \Big|_{1/2}^{3} x^2-x \rightarrow \pi\left[(3^2-3)^{1/2}-(1/2^2-1/2)\right] = 6.25\pi = \boxed{\frac{25\pi}{4}}$

2) $f(x)=3-x$ between $x=0$ and $x=3$

$-\pi\int -1(3-x)^2 dx = -\pi\Big|_0^3 \frac{(3-x)^3}{3} = -\pi\left[\frac{(3-3)^3}{3}-\frac{(3-0)^3}{3}\right] = \boxed{9\pi}$

3) $f(x)=2e^x$ between $x=0$ and $x=1$

$\pi\int_0^1(2e^x)^2 dx = \pi\int_0^1 \frac{4e^{2x}}{2}dx = \pi\Big|_0^1 2e^{2x} = 2e^{2(1)}-2e^{2(0)} = 14.778112 - 2 = \boxed{12.77\pi}$

$u=2x$ $du=2$

4) $f(x)=\sqrt{(2x+1)^3}$ from $x=0$ until $x=2$

$V=\pi\int_0^2(\sqrt{(2x+1)^3})^2 dx \rightarrow \pi\int_0^2(2x+1)^3 dx \rightarrow \pi\Big|_0^2 \frac{(2x+1)^4}{4} dx = \frac{(2(2)+1)^4}{4} - \frac{(2(0)+1)^4}{4} \rightarrow \boxed{156\pi}$

$156.25 - 1/4$

5) $f(x)=4Sin(4x)$ between $x=0$ and $x=\frac{\pi}{4}$

$\pi\int_0^{\pi/4}(4\sin(4x))^2 = \int 16\sin^2(4x)dx = 16\pi\int \sin^2(4x)dx = 16\pi\int \frac{1}{2}(1-\cos(8x))dx$

$\frac{16\pi}{2}\Big| x-\frac{1}{8}\sin 8x \rightarrow 8\pi\Big| x-\frac{1}{8}\sin 8x \rightarrow \left[\frac{\pi}{4}-\frac{1}{8}\sin 8(\frac{\pi}{4})\right]-\left[0-\frac{1}{8}\sin 8(0)\right] = \boxed{2\pi^2}$

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$8\cdot\frac{\pi}{4} = 2\pi = 2\pi^2$ $\quad \frac{\pi}{4} - 0 = 8\pi\cdot\frac{\pi}{4} =$

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6) $y=6x$ between $x=-2$ and $x=0$

$\pi\int_{-2}^{0}(6x)^2\,dx = \int 36x^2\,dx \rightarrow \pi\,|12x^3 \rightarrow 12(0)^3-12(-2)^3 = 0-(-96) = \boxed{96\pi}$

7) $f(x)=x^3$ between $x=1$ and $x=2$

$\pi\int_1^2 (x^3)^2\,dx \rightarrow \pi\int_1^2 x^6\,dx \rightarrow \pi\,\Big|_1^2 \frac{x^7}{7} \rightarrow \frac{(2)^7}{7}-\frac{(1)^7}{7} \rightarrow \frac{128}{7}-0 = \boxed{\frac{128\pi}{7}} \rightarrow 18.28\pi$

8) $f(x)=(1+\frac{x}{2})^2$ between $x=-1$ and $x=0$

$\pi\int_{-1}^{0}((1+\frac{x}{2})^2)^2 \rightarrow \int(1+\frac{x}{2})^4 \rightarrow \pi\,\Big|\,2\frac{(1+\frac{x}{2})^5}{5} = \pi\,\Big|\,\frac{2}{5}(1+\frac{x}{2})^5 = \frac{2}{5}-(\frac{1}{80}) = \boxed{\frac{31}{80}\pi}$ 6.38π

9) $y=\sqrt{3-2x}$ from $x=-3$ until $x=-1$

$\pi\int_{-3}^{-1}(\sqrt{3-2x})^2\,dx \rightarrow \pi\int_{-3}^{-1}3-2x \rightarrow \pi\,\Big|_{-3}^{-1}3x-x^2 \rightarrow [3(-1)-(-1)^2]-[3(-3)-(-3)^2] = \boxed{14\pi}$

$-4 \quad -(-18)$

10) $y=\frac{1}{x}$ between $x=1$ and $x=3$

$\pi\int_1^3(\frac{1}{x})^2\,dx \rightarrow \pi\int\frac{1}{x^2} \rightarrow$ $1x^{-2+1}=-1$ $\frac{x^{-1}}{-1} \rightarrow \frac{1}{-x^1} \rightarrow \frac{1}{-3}-\frac{1}{-1} \rightarrow -\frac{1}{3}-(-1) = \boxed{\frac{2}{3}\pi}$

11) $y=\frac{3}{2}x$ between $x=0$ and $x=2$

$\pi\int_0^2(\frac{3}{2}x)^2\,dx = \pi\int\frac{9}{4}x^2 \Rightarrow \pi\,\Big|\,\frac{\frac{9}{4}x^3}{3} \rightarrow \frac{3}{4}x^3 \rightarrow \frac{3}{4}(2)^3-\frac{3}{4}(0)^3 = \boxed{6\pi}$

$6 - 0 = 6$

Afuera ( )^2 desarrollar 12) $f(x)=\sqrt{x}+1$ between $x=0$ and $x=4$

$\pi\int(\sqrt{x}+1)^2\,dx = \int(x+2\sqrt{x}+1)\,dx \rightarrow \frac{x^2}{2}+\frac{4}{3}x^{3/2}+x \rightarrow \frac{68}{3}-0 = \pi\frac{68}{3} = 22.66\pi = \boxed{\frac{68}{3}}$

13) $f(x)=1-x^2$ from $x=-1$ until $x=1$

$\pi\int_{-1}^{1}(1-x^2)^2 \rightarrow \int(1-2x^2+x^4)\,dx = \pi\,\Big|\,x-\frac{2x^3}{3}+\frac{x^5}{5} \rightarrow \frac{8}{15}-(-\frac{8}{15}) = \boxed{\frac{16}{15}\pi}$

14) $f(x)=\sqrt{7x-5}$ between $x=5/7$ and $x=3$

$\pi\int_{5/7}^{3}(\sqrt{7x-5})^2 = \pi\int 7x-5 = \pi\,\Big|\,\frac{7x^2}{2}-5x \rightarrow \frac{7(3)^2}{2}-5(3) - \left[\frac{7(5/7)^2}{2}-5(5/7)\right] = \boxed{\frac{128\pi}{7}}$

$\frac{33}{2} - (-25/14)$ 18.28

15) $f(x)=\frac{4}{x}$ from $x=1$ until $x=4$

$\pi\int_1^4(\frac{4}{x})^2\,dx \Rightarrow \pi\int_1^4\frac{16}{x^2} \rightarrow 16x^{-2+1} = \frac{16x^{-1}}{-1} = \frac{16}{-x} \rightarrow \frac{16}{-4}-\frac{16}{-1} = -4-(-16) = \boxed{12\pi}$

16) $y=\sqrt{16-x^2}$ and the x- axis $= \pi\int(\sqrt{16-x^2})^2 = \pi\int 16-x^2 = \Big|_{-4}^{4}16x-\frac{x^3}{3} \rightarrow \boxed{85.33\pi}$

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$\sqrt{16-x^2}=0 \quad (x+4)(x-4) \quad x=-4 \quad x=4$

$\frac{128}{3}-(-\frac{128}{3}) = \frac{256}{3}\pi = 85.$