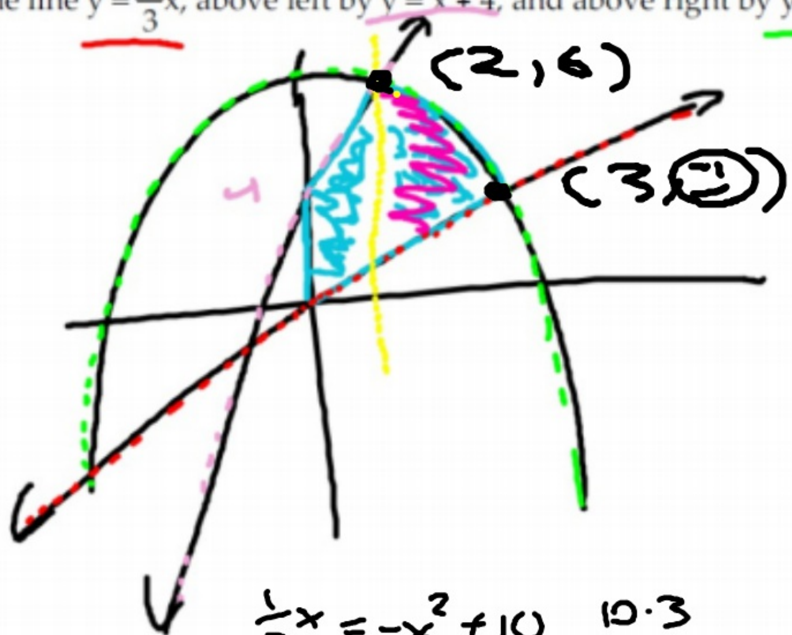
Find the area enclosed by the given curves.

15) Find the area of the region in the first quadrant bounded on the left by the y-axis, below by the line $y = \frac{1}{3}x$, above left by $y = x + 4$, and above right by $y = -x^2 + 10$. 15) ____________



$$\int_0^2 \left((x+4) - \frac{1}{3}x\right) dx + \int_2^3 \left((-x^2+10) - \frac{1}{3}x\right) dx$$

$\int_0^2 (X+4-(1/3)X)dx$
12.16666667
73/6
12.16666667

$\frac{1}{3}x = -x^2 + 10$ $\quad$ $10 \cdot 3$ $\quad$ $5 \cdot 6$

$3x^2 + x - 30 = 0$

$(3x+10)(x-3) = 0$

$x = 3$

$y = 2 + 4$

$x + 4 = -x^2 + 10$

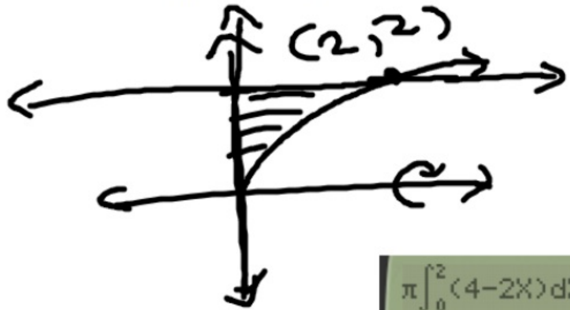
$x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

$x = 2$

Find the volume of the solid generated by revolving the region bounded by the given lines and curves about the x-axis.

16) $y = \sqrt{2x}$, $y = 2$, $x = 0$ 16) ________

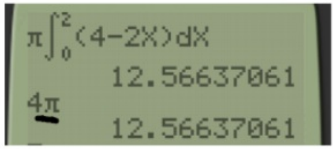


$\sqrt{2x} = 2$

$2x = 4$

$x = 2$

$$\pi \int_0^2 \left[(2)^2 - (\sqrt{2x})^2\right] dx$$



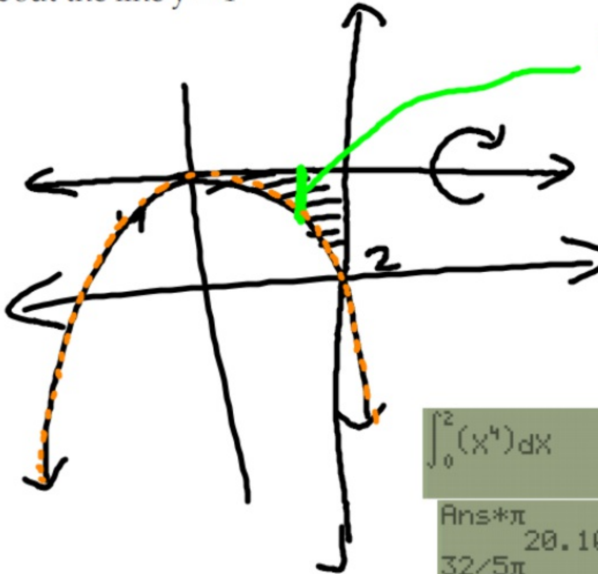
$$\pi \int_0^2 (4 - 2x)\, dx$$

Find the volume of the solid generated by revolving the region about the given line.

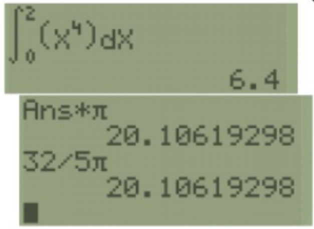
17) The region bounded above by the line $y = 4$, below by the curve $y = 4 - x^2$, and on the right by the line $x = 2$, about the line $y = 4$ 17) ______________

$x^2 = r$

$4 - (4 - x^2) = r$

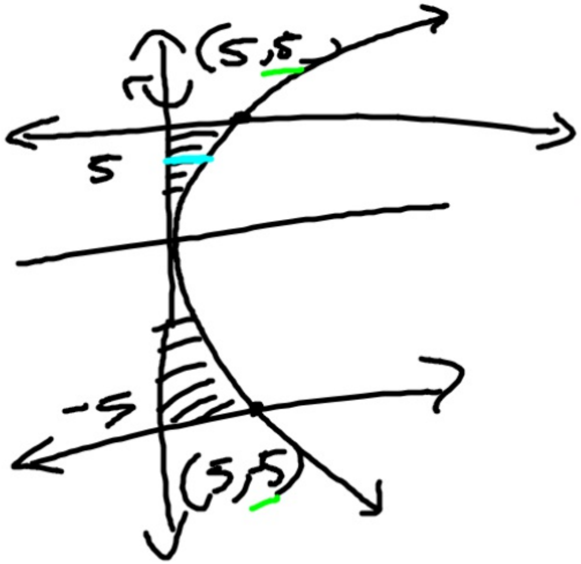


$$\pi \int_0^2 (x^2)^2 \, dx$$

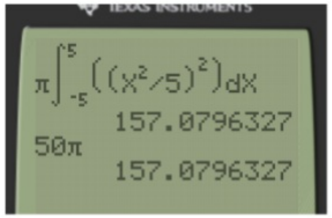


Find the volume of the solid generated by revolving the region about the y-axis.

18) The region enclosed by $x = \frac{y^2}{5}$, $x = 0$, $y = -5$, $y = 5$ 18) ______________



$$\pi \int_{-5}^{5} \left(\frac{y^2}{5}\right)^2 dy$$



Find the exact length of the curve analytically by antidifferentiation.

19) $x = \frac{2}{3}(y - 1)^{3/2}$ from $y = 1$ to $y = 4$ 19) ________

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

$\int_a^b \sqrt{1+\left(\frac{dy}{dx}\right)^2}$

20) $y = \int_0^x \sqrt{4 \sin^2 t - 1}\, dt$, $0 \le x \le \frac{\pi}{2}$ 20) ________

(19) $\int_1^4 \sqrt{1+\left((y-1)^{\frac{1}{2}}\right)^2} = \int_1^4 \sqrt{y}\, dy$

$\int_1^4 (\sqrt{X})dX$

4.666666667

14/3

4.666666667