Calculus

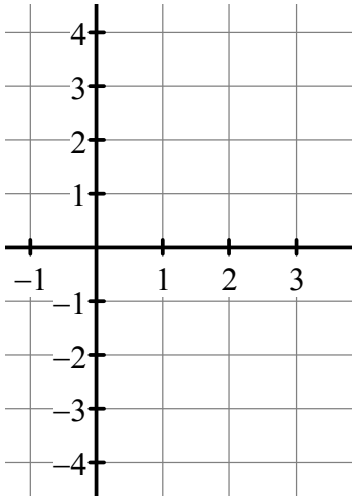
Write your questions and thoughts here!

11.2 Solids of Revolution (Discs) Name:_____

Notes

Finding the volume of a solid of revolution.

1. Sketch the area bounded by the equations. $y = x^2$, $y = 0, x = 2$.
2. Revolve it around the *x*-axis to create a solid.
3. What does the area of a cross section look like?
4. What is the area of a circle?
5. What is the radius of this circle?
6. What is the area of one cross-section?
7. What is the volume of the solid?



Volume of a Solid of Revolution

$$V =$$

where $R(x)$ is the "distance" between the axis of revolution and the outside of the object.

Example 2: $y = x + 1, y = 0, x = 0, \ x = 2$. Revolve about the x-axis.

Example 3: $y = 3 - x^2, y = 2, x = 0, x = 1$. Revolve about the line $y = 2$.

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Example 4: $x = 2 - y^2, x = 1$. Revolve about the line $x = 1$.

Example 5: $x = 2 - y^2, x = -2$. Revolve about the line $x = -2$.

Now summarize what you learned!

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Calculus

Practice

For each problem, sketch the area bounded by the equations and revolve it around the *x*-axis. Find the volume of the resulting solid formed by this revolution. Leave your answers in terms of π.

1. $y = -x + 2,\ x = 0,\ y = 0$

2. $y = \sqrt{x},\ x = 1,\ x = 4$

3. $y = 4 - x^2,\ y = 0,\ x \geq 0$

4. $y = \sqrt{9 - x^2},\ x \geq 0,\ y = 0$

5. $y = x^3,\ y = 0,\ x = 2$

6. $y = \sqrt{\sin x}, y = 0, x = 0, x = \pi$

Same instructions as above but revolve around the *y*-axis now. Again, leave your answers in terms of π.

7. $y = -x + 2,\ x = 0,\ y = 0$

8. $y = \sqrt{x},\ y = 2,\ x = 0$

9. $y = 4 - x^2,\ y = 0,\ x \geq 0$

10. $y = \sqrt{9 - x^2},\ y = 0,\ x \geq 0$

Same instructions as above but revolve around the given HORIZONTAL line.

11. $y = 2 - x^2$ and $y = 1$ about the line $y = 1$.

12. $y = x^2$ and $y = 4$ about the line $y = 4$.

Same instructions as above but revolve around the given VERTICAL line.

13. $y = \sqrt{x},\ y = 0,\ x = 4$ about the line $x = 4$.

14. $y = x,\ y = 0,\ x = 6$ about the line $x = 6$.

11.2 Solids of Revolution (Discs)

Test Prep

1. What is the area of the region between the graphs of $y = x^3$ and $y = -x - 1$ from $x = 0$ to $x = 2$?

(A) 0 (B) 4 (C) 5

(D) 8 (E) 10

2. Let $F(x)$ be an antiderivative of $\frac{2(\ln x)^4}{3x}$. If $F(2) = 0$, then $F(8) =$

(A) 5.163 (B) 0.860 (C) 0.184

(D) 0.180 (E) 0.004

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3. The average value of $f(x) = -\sin x$ on the interval $[-2, 4]$ is

(A) $\frac{\cos 4+\cos 2}{6}$ (B) $\frac{\cos 2-\cos 4}{2}$ (C) $\frac{\cos 4+\cos 2}{2}$

(D) $\frac{\cos 4-\cos 2}{2}$ (E) $\frac{\cos 4-\cos 2}{6}$

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4. If $F(x) = \int_1^{x^2} \sqrt{t^2+3}\, dt$, then $F'(2) =$

(A) $4\sqrt{19}$ (B) $2\sqrt{19}$ (C) $4\sqrt{7}$

(D) $2\sqrt{7}$ (E) $\sqrt{7}$
