Preface

Here are a set of problems for my Calculus I notes. These problems do not have any solutions available on this site. These are intended mostly for instructors who might want a set of problems to assign for turning in. I try to put up both practice problems (with solutions available) and these problems at the same time so that both will be available to anyone who wishes to use them.

As with the set of practice problems I write these as I get the time and some sections will have only a few problems at this point and others won’t have any problems in them yet. Rest assured that I’m always trying to get more problems written but this site has been written and maintained in my spare time and so I usually cannot devote as much time as I’d like to the site.

Volumes of Solids of Revolution / Method of Rings

For problems 1 – 16 use the method disks/rings to determine the volume of the solid obtained by rotating the region bounded by the given curves about the given axis.

1. Rotate the region bounded by \( y = 2x^2 \), \( y = 8 \) and the \( y \)-axis about the \( y \)-axis.

2. Rotate the region bounded by \( y = 2x^2 \), \( y = 8 \) and the \( y \)-axis about the \( x \)-axis.

3. Rotate the region bounded by \( y = 2x^2 \), \( x = 2 \) and the \( x \)-axis about the \( x \)-axis.

4. Rotate the region bounded by \( y = 2x^2 \), \( x = 2 \) and the \( x \)-axis about the \( y \)-axis.

5. Rotate the region bounded by \( x = y^3 \), \( x = 8 \) and the \( x \)-axis about the \( x \)-axis.

6. Rotate the region bounded by \( x = y^3 \), \( x = 8 \) and the \( x \)-axis about the \( y \)-axis.

7. Rotate the region bounded by \( x = y^3 \), \( y = 2 \) and the \( y \)-axis about the \( x \)-axis.

8. Rotate the region bounded by \( x = y^3 \), \( y = 2 \) and the \( y \)-axis about the \( y \)-axis.
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9. Rotate the region bounded by \( y = \frac{1}{x^2} \), \( y = 9 \), \( x = -2 \), \( x = -\frac{1}{10} \) and the \( x \)-axis about the \( y \)-axis.

10. Rotate the region bounded by \( y = \frac{1}{x^2} \), \( y = 9 \), \( x = -2 \), \( x = -\frac{1}{10} \) and the \( x \)-axis about the \( x \)-axis.

11. Rotate the region bounded by \( y = 4 + 3e^{-x} \), \( y = 2 \), \( x = \frac{1}{2} \) and \( x = 3 \) about the \( x \)-axis.

12. Rotate the region bounded by \( x = 5 - y^2 \) and \( x = 4 \) about the \( y \)-axis.

13. Rotate the region bounded by \( y = 6 - 2x \), \( y = 3 + x \) and \( x = 3 \) about the \( x \)-axis.

14. Rotate the region bounded by \( y = 6 - 2x \), \( y = 3 + x \) and \( y = 6 \) about the \( y \)-axis.

15. Rotate the region bounded by \( y = x^2 - 2x + 4 \) and \( y = x + 14 \) about the \( x \)-axis.

16. Rotate the region bounded by \( x = (y - 3)^2 \) and \( x = 16 \) about the \( y \)-axis.

17. Use the method of disks/rings to determine the volume of the solid obtained by rotating the region bounded by \( y = 2x^2 \), \( y = 8 \) and the \( y \)-axis about the
   \( \text{(a)} \) line \( x = 3 \)
   \( \text{(b)} \) line \( x = -2 \)
   \( \text{(c)} \) line \( y = 11 \)
   \( \text{(d)} \) line \( y = -4 \)

18. Use the method of disks/rings to determine the volume of the solid obtained by rotating the region bounded by \( x = y^2 - 6y + 9 \) and \( x = -y^2 + 6y - 1 \) about the
   \( \text{(a)} \) line \( x = 10 \)
   \( \text{(b)} \) line \( x = -3 \)

19. Use the method of disks/rings to determine the volume of the solid obtained by rotating the triangle with vertices \( (3,2) \), \( (7,2) \) and \( (7,14) \) about the
   \( \text{(a)} \) line \( x = 12 \)
   \( \text{(b)} \) line \( x = 2 \)
   \( \text{(c)} \) line \( x = -1 \)
   \( \text{(d)} \) line \( y = 14 \)
   \( \text{(e)} \) line \( y = 1 \)
   \( \text{(f)} \) line \( y = -3 \)

20. Use the method of disks/rings to determine the volume of the solid obtained by rotating the region bounded by \( y = 4 + 3e^{-x} \), \( y = 2 \), \( x = \frac{1}{2} \) and \( x = 3 \) about the
   \( \text{(a)} \) line \( y = 7 \)
   \( \text{(b)} \) line \( y = 1 \)
   \( \text{(c)} \) line \( y = -3 \)
21. Use the method of disks/rings to determine the volume of the solid obtained by rotating the region bounded by $x = 3 + y^2$ and $x = 2y + 11$ about the
   (a) line $x = 23$  
   (b) line $x = 2$  
   (c) line $x = -1$

22. Use the method of disks/rings to determine the volume of the solid obtained by rotating the region bounded by $y = 5 + \sqrt{x}$, $y = 5$ and $x = 4$ about the
   (a) line $y = 8$  
   (b) line $y = 2$  
   (c) line $y = -2$

23. Use the method of disks/rings to determine the volume of the solid obtained by rotating the region bounded by $y = 10 - 2x$, $y = x + 1$ and $y = 7$ about the
   (a) line $x = 8$  
   (b) line $x = 1$  
   (c) line $x = -4$

24. Use the method of disks/rings to determine the volume of the solid obtained by rotating the region bounded by $y = -x^2 - 2x - 5$ and $y = 2x - 17$ about the
   (a) line $y = 3$  
   (b) line $y = -1$  
   (c) line $y = -34$

25. Use the method of disks/rings to determine the volume of the solid obtained by rotating the region bounded by $x = -2y^2 - 3$ and $x = -5$ about the
   (a) line $x = 4$  
   (b) line $x = -2$  
   (c) line $x = -9$