

Review for Test 2

1. Chapter 8 Check Your Understanding: 1, 3, 4, 6, 7, 8
2. Chapter 9 Check Your Understanding: 1, 3, 5, 7, 17, 19, 34
3. Chapter 9 Review: 1, 7, 9, 13, 23, 27
4. Chapter 8 Review: 21, 23, 31, 42(a), 43, 45, 48,

5. a. Compute the volume of a solid whose base is the region bounded by $y = x^2 - 4$ and the x -axis and whose cross-sections perpendicular to the x -axis are equilateral triangles.

b. Now compute the volume of the solid with the same base but whose cross-sections perpendicular to the y -axis are equilateral triangles.

6. Find the volume of a region whose base is a triangle with vertices $(0, 0)$, $(2, 0)$, and $(0, 1)$ and whose cross-section perpendicular to the x -axis are semicircles.

7. Section 8.4: 11, 13

8. Section 8.5 7, 11, 17

9. Guess whether the following converge or diverge. Then show it (you must actually show the comparison, not just give an idea of why you think it is based on looking at highest powers, etc):

- a) $\int_2^{\infty} \frac{1}{x+1+\sin x} dx$
- b) $\int_1^{\infty} \frac{1}{x^{10}+2x} dx$
- c) $\int_0^2 \frac{1}{x^3+2} dx$
- d) $\int_1^{\infty} e^{-x^2} dx$

10. Write an integral that represents the arclength of the following curves:

- a) $y = \sin x$ between $x = 0$ and $x = 2\pi$.
- b) $y = x^3 + 1$ between $x = -1$ and $x = 1$.
- c) the parametric curve $x = e^{2t}$, $y = \cos t$ for $t \in [0, 3]$.
- d) the ellipse $x = 2 \cos t$, $y = 4 \sin t$ for $t \in [0, 2\pi]$.
- e) $y = \ln x$ between $x = 1$ and $x = 2$.

11. Let R be the region bounded by the curve $y = x^2$, the x -axis, and the lines $x = 1$ and $x = 2$. Compute the volumes of the following solids:

- a) the solid defined by rotating R about the y -axis.
- b) the solid defined by rotating R about the x -axis.
- c) the solid defined by rotating R about the line $y = 6$.

d) the solid whose base is R and whose cross-sections perpendicular to the x -axis are circles.

e) the solid whose base is R and whose cross-sections perpendicular to the y -axis are equilateral triangles.

12. Suppose a chain is hanging over the side of a platform. If the chain is 3 m long and its mass is 6 kg/m, how much work is required to pull the chain up?

13. How much work does it take to pump out 28 cubic feet of water from the top of a rectangular container 15 feet high with a square base which is 2 feet by 2 feet (so the water is 7 feet high)?

14. Decide which of the following series converge and which diverge. Compute the sum if possible. Justify your answer:

$$\sum_{n=1}^{\infty} \frac{1}{2^n}, \sum_{n=1}^{\infty} \frac{1}{2^2}, \sum_{n=1}^{\infty} \frac{1}{n^{1.2}}, \sum_{n=1}^{\infty} n^{-1}, \sum_{n=1}^{\infty} \frac{1}{n^{0.2}}, \sum_{n=1}^{\infty} \frac{1}{n^2}, \sum_{n=1}^{\infty} \frac{1}{n \ln n}, \sum_{n=1}^{\infty} \frac{1}{e^n}$$

15. True/False, if false correct:

a) All geometric series converge.

b) For any p , the series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges.

c) The units kg can denote force.

d) Mass and weight are the same thing.

e) Force and weight use the same units.

f) If $\int_1^{\infty} f(x) dx$ converges, then $\sum_{n=1}^{\infty} f(n)$ converges.

g) The sequence $1, 1/2, 1/3, 1/4, 1/5, \dots$ converges.

h) The series $\sum_{n=2}^{\infty} \frac{n^2-1}{n^2}$ converges.

i)

$$\sum_{n=2}^9 7 \frac{1}{3^n} = \frac{7(1 - \frac{1}{3^9})}{1 - \frac{1}{3}}$$