Chapter 8 Calculus Practice Exam

The function v(t) = t² - 4 is the velocity in m/sec for a particle moving along the x-axis, where t is measured in seconds (t ≥ 0). Use analytic methods to do each of the following.
(a) Determine when the particle is moving to the right, to the left, and stopped.

 Right:
 Right:
 Left:
 Stopped:

(b) Find the particle's displacement for 0 ≤ t ≤ 5

 Find the total distance traveled by the particle for 0 ≤ t ≤ 5
 Left:
 Stopped:
 Left:
 Stopped:

(c) Find the total distance traveled by the particle for 0 ≤ t ≤ 5
Left:
Stopped:
Left:
Stopped:
Stopped:

(a) Find the total distance traveled by the particle for 0 ≤ t ≤ 5
Left:
Stopped:
Stop

2a.	
	_

2b._____

3. The rate of expenditures on public elementary and secondary schools (in billions of dollars a year) in the United States can be modeled by the function $S = 6.22e^{0.086t}$, where t is the number of years after January 1, 1950.

Find the total expenditures from January 1, 1950 to January 1, 1990.

3._____

4. Find the area of the shaded region analytically.



[-3, 3] by [-6, 18]

5. Find the area of the region enclosed by the line y = 3x + 4 and the parabola $y = x^2 - 3x - 12$.

6. Find the area enclosed by $y = \sqrt{x}$, y = 6 - 2x and the x-axis.

6._____

5.____

4._

7. Find the volume generated by revolving the shaded region about the x-axis



7._____

8. A curve is given by $y = \left(9 - x^{\frac{2}{3}}\right)^{\frac{3}{2}}$ for $1 \le x \le 8$. Find the exact length of the curve analytically by antidifferentiation.

9. A curve is given by $\int_0^y \sqrt{9t^2 + 6t} dt$ for $1 \le y \le 5$. Find the exact length of the curve analytically by antidifferentiation.

9._____

10. Find the length of the nonsmooth curve $y = (x)^{\frac{2}{5}}$ for $-1 \le x \le 1$. (Round your answer to the nearest 0.001.)

10._____

11. A right cylindrical tank is filled with sea water. The tank has a radius of 6 feet and a height of 12 feet. If the water level is now 3 feet below the top of the tank, how much work will be required to pump the sea water to the top of the tank? (The weight-density of seawater is 64 lb/ft^3 .)

11._____

8._____

- 12. Let R be the region in the first quadrant enclosed by the y-axis and the graphs of $y = 2 + \sin(x)$ and $y = \sec(x)$.
 - (a) Find the area of R.

(b) Find the volume of the solid generated when R is revolved about the x - axis.

12b._____

(c) Find the volume of the solid whose base is R and whose cross sections cut by planes perpendicular to the x-axis are squares.

12c._____