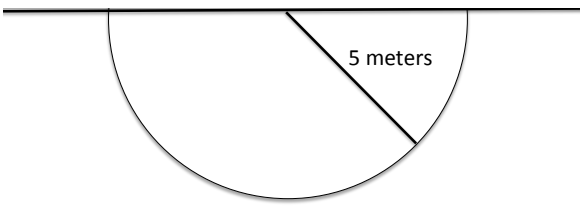
Math 122
Quiz 5 Review

1. The vertical wall on the end of a swimming pool is 20 ft wide and 8 ft high. If water in the swimming pool is filled to a height of 7 ft. Find the force exerted on the wall by the water. ($\rho g = 62.4\text{lb/ft}^3$).

2. The vertical gate of a dam has the shape of a trapezoid, 12 ft at the top, 8 ft at the bottom and 4 ft high. What is the force on the gate when the surface of the water is 2ft above the top of the gate ? ($\rho g = 62.4\text{lb/ft}^3$)

3. The viewing port of a submarine is a circle of radius 1 ft. If the center of the viewing port is 100 ft. below the surface, find the force exerted by the water on it. ($\rho g = 62.4\text{lb/ft}^3$)

4. Find the force on a vertical flat plate in the form of a semicircle 5 meters in radius that is submerged in water ($\rho g = 9810\ \text{N/m}^3$).



Find the center of mass for:

5. The region bounded by $f(x) = x^2$ and the x-axis for $[0, 2]$.

6. The region bounded by $f(x) = \sqrt{x}$ and the x-axis for $[0, 4]$.

7. The region bounded by $f(x) = 2x - x^2$ and the x-axis.

8. The region bounded by $f(x) = x^2 - 3$ and $g(x) = -x^2 + 2x + 1$.

9. The region bounded by $\frac{x}{a} + \frac{y}{b} = 1$ the x-axis and the y-axis.

10. Verify that $y = \frac{x^4}{16}$ is a solution of the differential equation

$$\frac{dy}{dx} = xy^{1/2}$$

11. Verify that $y = x^2 + 2x + 2 + Ce^x$ is a solution of the differential equation

$$y' - y + x^2 = 0$$

Find the general solution of :

12. $\frac{dy}{dx} = (x+1)^2$

13. $y^2y' = 3x^2$

14. $y' = x^3y^2 + y^2$

15. $y' = 5 - 2y$

16. $\frac{dy}{dx} = \frac{x}{y^2}$

17. $\frac{dy}{dx} = \frac{7}{y}$

18. $x(y-1)y' = y$

19. Solve $\frac{dy}{dx} = 1 + y \qquad y(0) = 5$

20. Solve $\frac{dy}{dx} = y^{2/3} \qquad y(0) = 8$

21. Solve $\frac{dy}{dx} = y \qquad y(0) = 3$

Answers

1. 30,576 lbs

2. 9,651.2 lbs

3. 19,604 lbs.

4. 817,500 N

5. $\left(\frac{3}{2}, \frac{6}{5}\right)$

6. $\left(\frac{12}{5}, \frac{3}{4}\right)$

7. $\left(1, \frac{2}{5}\right)$

8. $\left(\frac{1}{2}, -\frac{1}{2}\right)$

9. $\left(\frac{a}{3}, \frac{b}{3}\right)$

12. $y = \frac{(x+1)^3}{3} + C$

13. $y = \sqrt[3]{3x^3 + C}$

14. $y = \frac{-4}{x^4 + 4x + C}$

15. $y = \frac{5}{2} + Ce^{-2x}$

16. $y = (\frac{3}{2}x^2 + C)^{1/3}$

17. $y = \pm\sqrt{14x + C}$

18. $y - \ln|y| = \ln|x| + C$

19. $y = 6e^x - 1$

20. $y = (\frac{x}{3} + 2)^3$

21. $y = 3e^x$