

Math 152 Exam 1 Review

1. Find the area of the region bounded by:

a)  $y = 18 - x^2$ ,  $y = 3x$ ,  $y = 0$ , and  $x = 4$ .

b)  $y = 18 - x^2$ ,  $y = 3x$ ,  $x = 0$ , and  $x = 4$ .

2. Find the volume of each solid.

a) The base in the x-y plane is an isosceles triangle with base 6 m on the x-axis and height 4 m on the y-axis. Cross sections perpendicular to the y-axis are semicircles.

b) Same as a except cross sections perpendicular to the x-axis are semicircles.

c) Same as a except cross sections perpendicular to the x-axis are squares.

3. Find the volume of each solid:

a) The region bounded by  $y = \ln(x)$  and  $y = x$  for  $x$  between 1 and 2 is rotated about the x axis.

b) The same region as in a is rotated around the line  $y = -3$ .

c) The same region is rotated around the y-axis.

d) The same region is rotated around the line  $x = -3$ .

4. Find the volume if the region bounded by  $x = y^2 - 1$ ,  $0 \leq x \leq 8$ , is rotated about the line  $y = 5$ .

5. The work required to stretch a spring from 10 cm beyond its natural length to 20cm beyond its natural length is 3 J. Find the work required to stretch it from 15 cm beyond its natural length to 25 cm beyond its natural length.

6. A rope is 30 ft. long and weighs 60 lbs. It hangs from a 50 ft. tall building. Find the work done in pulling 8 ft. of the rope to the top of the building.

7. a) A semispherical tank has a spout 1 m above the top. The radius of the tank is 6 m. The tank is full of water. How much work is done in pumping all the water out the spout?

b) A tank in the shape of a right circular cone with base radius 4 m and height 6 m is full of water to a depth of 5 m. Find the work done in pumping the water out the top of the tank.

8. Find each anti-derivative .

a)  $\int x^2 \ln x dx$     b)  $\int \frac{\ln x}{x} dx$     c)  $\int x^a \ln x dx$      $a \neq -1$

$$d) \int \arcsin(x) dx$$

$$e) \int_{-\frac{1}{2}}^{\frac{1}{2}} x \arcsin x dx \quad f) \int x \sin x dx \quad g) \int x^2 e^x dx \quad h) \int (\ln x)^2 dx$$

$$i) \int x \sqrt{2x+1} dx \quad j) \int \frac{x^9}{\sqrt{x^5+4}} dx \quad k) \int x \arctan\left(\frac{x}{2}\right) dx$$

9. Evaluate the definite integral or find the indefinite integral.

$$a) \int_0^{\pi/2} \sin^3 x \cos^2 x dx \quad b) \int \sin^2 x dx \quad c) \int \sec^4 x dx$$

$$d) \int \tan^4 x dx \quad e) \int \sec^3 x \tan^3 x dx \quad f) \int \sin 3x \cos x dx$$

$$g) \int \sin 5x \sin 3x dx$$