PRACTICE QUESTIONS 1
Sections 26.1-26.6

1. A car is travelling at 30 m/s. The driver slams on the brakes and the car decelerates at 110 m/s^2. How far does the car travel while stopping? Round your answer to one decimal place.

2. Find the area bounded by $y = x^2, y = x, y = 4, y = 9$.

3. Find the total area bounded by: $y = 3x, y = x^2, x = 0, x = 5$.

4. Find the volume of the solid formed by revolving the first-quadrant region bounded by $y = \sqrt{x} + 1$ and $x = 4$ about the x-axis.

5. Find the volume of the solid produced when the first-quadrant region bounded by $y = 8 - x, y = 3$ and $x = 0$ is revolved about the x-axis.

6. Find the centroid of the first-quadrant region bounded by $y = \sqrt{x}, x = 4$ and the axes.

7. Consider the first-quadrant region bounded by $y = 9 - x^2$ and the axes. A solid is produced by revolving this region about the y-axis. Find the centroid of the solid.

8. The first-quadrant region bounded by $y = 36 - x^2$ is revolved about the y-axis to produce a solid with density k. Find the moment of inertia and radius of gyration of the solid with respect to the y-axis.

9. A thin, flat metal plate has density k. The plate is bounded by $y = x^2, y = 0$ and $x = 3$. Find the moment of inertia and the radius of gyration of the plate with respect to the x-axis.

10. A section of a dam is in the shape of a right triangle. The base of the triangle is 6m long and is at the surface of the water. The side of the triangle is 4m long. Find the force on the section due to water pressure using the formula $F = 9800 \int_a^b hl \; dh$.

11. Hooke's Law says that the force required to stretch a spring is proportional to the amount that it is stretched, in other words if a spring is stretched x metres from its natural length then $F(x) = kx$.
a) A spring of natural length 0.1m requires a force of 5N to stretch it to a length of 0.14m. Find k.
b) Find the work done in stretching this spring from its natural length to a length of 0.22m.

12. Find the work done in pumping water out of the top of a cylindrical tank 3m in radius and 8m in height, given that the tank is initially half-full and water weighs 9800 N/m^3.