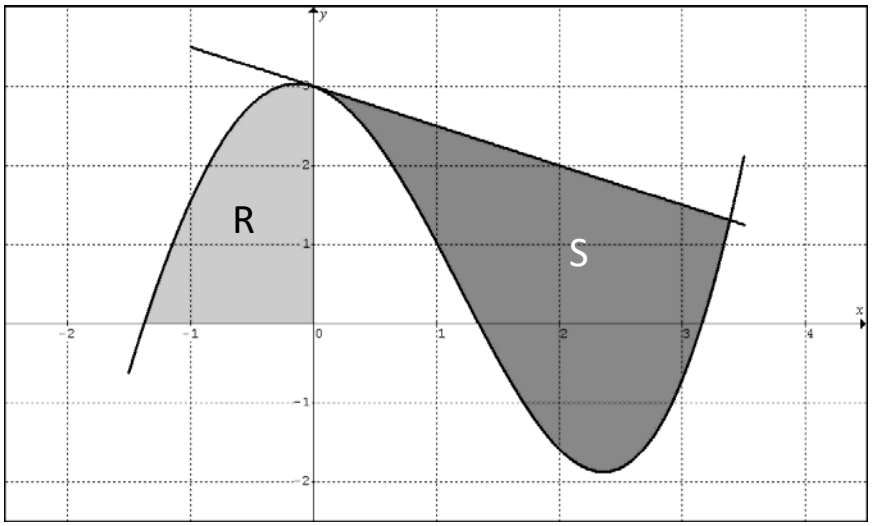
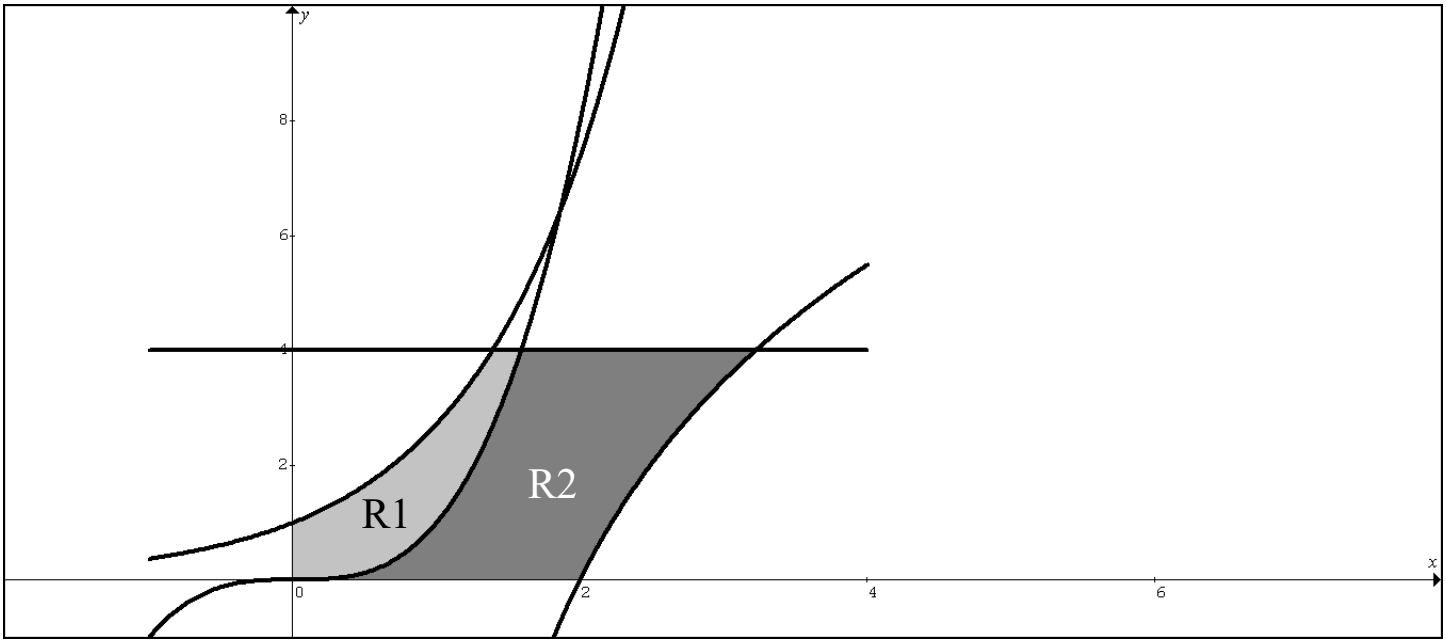
AB: Q402 CH7 PRACTICE EXAMINATION – CALCULATOR PERMISSION VARIES



1. (CALCULATOR REQUIRED) Let f be the function $f(x)=\frac{x^3}{4}-\frac{x^2}{3}-\frac{x}{2}+3\cos x$. Let R be the shaded region in the second quadrant bounded by the graph of f, and let S be the shaded region bounded by the graph of f and the line ℓ, the line tangent to the graph of f at $x=0$, as shown above.

(a) Find the area of region R.
(b) Find the volume of the solid generated when R is rotated about the horizontal line $y=-2$.
(c) The region R is the base of a solid. Every cross section perpendicular to the x-axis is an equilateral triangle whose side lies flat on R. Write, but do not evaluate, an expression involving one or more integrals that can be used to find the volume of the solid.
(d) Write, but do not evaluate an expression involving one or more integrals used to find the perimeter of region R.
(e) Write, but do not evaluate, an integral expression that can be used to find the area of S.
(f) Consider the function $g(x)=\int_{-1}^{x} f(t)dt$. Find the length of g on $-1\le x\le 0$.



2. (NO CALCULATOR) Consider the curves $y = e^x$, $y = x^3$, $y = 5\ln(x-1)$, and $y = 4$ each shown above.

Let R1 be the light shaded region bounded in the first quadrant by the graphs of $y = e^x$, $y = x^3$, and $y = 4$.

Let R2 be the dark shaded region bounded in the first quadrant by the graphs of $y = x^3$, $y = 5\ln(x-1)$, and $y = 4$.

A. Write, but do not evaluate, and expression involving one or more integrals used to find the volume of the solid generated when R2 is rotated about the vertical line $x = 6$.

B. The region R2 is the base of a solid. Every cross section perpendicular to the *y*-axis is a square whose side lies flat on R2. Write, but do not evaluate, an expression involving one or more integrals that can be used to find the volume of the solid.

C. **FIND** the area of region R2.

D. Write, but do not evaluate, an expression involving one or more integrals, used to find the area of region R1.

E. Write, but do not evaluate, an expression involving one or more integrals, used to find the perimeter of region R2.