

[30] 1. Integrate.

a) $\int \frac{x dx}{(9 + x^2)^{1/2}}$

b) $\int x(x^2 + 3x + 5) dx$

c) $\int (\sin 2x - 4 \cos 3x) dx$

d) $\int x e^{-x^2} dx$

e) $\int \cos x \tan x \, dx$

f) $\int (e^{2x} + 4e^{3x} + e^{-x}) \, dx$

[20] 2. Evaluate:

a) $\int_2^{-2} x(1+x^2)^{1/2} \, dx$

b) $\int_{e^4}^{e^6} \frac{dx}{x \ln x}$

c) $\int_0^{\pi/12} (3 \cos 2x + 4 \sin 3x) dx$

[10] 3. Find the area bounded by the curves $f(x) = x^2 - 6$ and $g(x) = x$.

[30] 4. a) Shade the region bounded by the curves $y = x^2$, $y = 4$, y -axis and $x \geq 0$.

b) **Set up but do not evaluate** the volume when this region is rotated about the x -axis.

c) **Set up but do not evaluate** the volume when this region is rotated about the y -axis.

d) **Set up but do not evaluate** the volume when this region is rotated about the line $y = -1$.

[6] 5. Evaluate $\int_{-2}^2 f(x)dx$ if $f(x) = \begin{cases} x & x \leq 1 \\ x^2 & x > 1 \end{cases}$.

[8] 6. Consider

a) Find $a(3)$.

b) Graph the acceleration of the particle.

c) Find the total distance traveled for $0 \leq t \leq 6$.