MATH 110 Problem Set 4.4

Edward Doolittle

Thursday, April 2, 2026

The following problems based on Section 4.4 of the textbook will help you study. *You do not need to hand in solutions to these problems.*

1. (Based on 4.4.5–16) Find the general indefinite integral.

   (a) $\int v(v^2+2)^2\,dv$ (b) $\int \sec t(\sec t+\tan t)dt$ (c) $\int \dfrac{\sin 2x}{\sin x}\,dx$

2. (Based on 4.4.19–42) Evaluate the following integrals.

   (a) $\displaystyle\int_0^{\pi/3} \frac{\sin\theta+\sin\theta\tan^2\theta}{\sec^2\theta}\,d\theta$ (b) $\displaystyle\int_0^1 (1+x^2)^3\,dx$ (c) $\displaystyle\int_1^8 \frac{x-1}{\sqrt[3]{x^2}}\,dx$

3. (Based on 4.4.55–58)

   (a) The velocity function (in m/s) for a particle moving along a line is $v(t)=t^2-2t-8$, $1\le t\le 6$. Find the displacement and the distance traveled by the particle during the given time interval.

   (b) The acceleration function (in m/s^2) for a particle moving along a line is $a(t)=2t+3$, $0\le t\le 3$, and the initial velocity for the particle (in m/s) is $v(0)=-4$. Find the velocity of the particle at time t and the distance traveled during the time interval $0\le t\le 3$.

4. (Based on 4.4.60) Water flows from the bottom of a storage tank at a rate of $r(t)=200-4t$ litres per minute, where $0\le t\le 50$. Find the total amount of water that has flowed from the tank during the first 10 minutes.

You may find the following additional exercises from Section 4.4 helpful.

4.4 C-level: 1–42, 47–58
B-level: 45–46, 59–60
A-level: 61–68