

## 5.4 Practice Problems

$$\begin{aligned}
 1. \quad I &= \int \frac{1}{x} + \frac{1}{x^{5/4}} + \frac{1}{x^{3/4}} dx \\
 &= \int \frac{1}{x} + x^{-5/4} + x^{-3/4} dx \\
 &= \ln|x| - 4x^{-1/4} + 4x^{1/4} + C
 \end{aligned}$$

$$\begin{aligned}
 2. \quad I &= \int \frac{1}{\sqrt{x}} + \sqrt{x} dx \\
 &= \int x^{-1/2} + x^{1/2} dx \\
 &= 2x^{1/2} + \frac{2}{3}x^{3/2} + C
 \end{aligned}$$

$$\begin{aligned}
 3. \quad I &= \int 3x^2 + 8x^3 - 7x^8 + 2x^{-3} dx \\
 &= x^3 + 2x^4 - \frac{7}{9}x^9 - x^{-2} + C
 \end{aligned}$$

$$4. \quad I = \int \cos(r) dr = \sin(r) + C$$

$$5. \quad I = \int t^2 dt = \frac{1}{3}t^3 + C$$

$$6. \quad I = \int dx = \int 1 dx = x + C$$

$$7. \quad I = \int dy = y + C$$

$$8. \quad I = \int dz = z + C$$

$$9. \quad I = \int \frac{2}{1+x^2} + \frac{3}{\sqrt{1-x^2}} dx = 2 \tan^{-1} x + 3 \sin^{-1} x + C$$

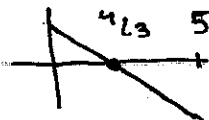
$$10. \quad I = \int e^x + \sinh x dx = e^x + \cosh x + C$$

2

$$\begin{aligned}
 11 \quad I &= \int \frac{5}{7} x^{2/5} + \frac{5}{7} x^{5/7} + \frac{5}{7} x^{-5/7} dx \\
 &= \frac{5}{7} \frac{x^{12/5}}{12/5} + \frac{5}{7} \frac{x^{12/7}}{12/7} + \frac{5}{7} \frac{x^{2/7}}{2/7} + C \\
 &= \frac{25}{84} x^{12/5} + \frac{5}{12} x^{12/7} + \frac{5}{2} x^{2/7} + C
 \end{aligned}$$

12

$$v(t) = 4 - 3t \quad [0, 5]$$



$$\begin{aligned}
 \text{displacement} &= \int_0^5 4 - 3t dt = 4t - \frac{3}{2}t^2 \Big|_0^5 \\
 &= (20 - \frac{75}{2}) - (0 - 0) \\
 &= -\frac{35}{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{distance} &= \int_0^5 |4 - 3t| dt = \int_0^{4/3} 4 - 3t dt - \int_{4/3}^5 4 - 3t dt \\
 &= 4t - \frac{3}{2}t^2 \Big|_0^{4/3} - (4t - \frac{3}{2}t^2) \Big|_{4/3}^5 \\
 &= (\frac{16}{3} - \frac{3}{2} \cdot \frac{16}{9}) - (0 - 0) - (20 - \frac{75}{2}) + (\frac{16}{3} - \frac{3}{2} \cdot \frac{16}{9}) \\
 &= (\frac{16}{3} - \frac{8}{3}) - (20 - \frac{75}{2}) + (\frac{16}{3} - \frac{8}{3}) \\
 &= \frac{16}{3} - 20 + \frac{75}{2} = 22.83
 \end{aligned}$$

13

$$v(t) = \sin t \quad [0, 5]$$

$$\begin{aligned}
 \text{displacement} &= \int_0^5 \sin t dt = -\cos t \Big|_0^5 = -\cos 5 + \cos 0 \\
 &= 1 - \cos 5 = .7163
 \end{aligned}$$

$$\begin{aligned}
 \text{distance} &= \int_0^5 |\sin t| dt = \int_0^\pi \sin t dt - \int_\pi^5 \sin t dt \\
 &= -\cos t \Big|_0^\pi - (-\cos t) \Big|_\pi^5 \\
 &= (-\cos \pi - (-\cos 0)) - [(-\cos 5) - (-\cos \pi)] \\
 &= (1 + 1) - [-\cos 5 - 1] \\
 &= 3 + \cos 5 = 3.2837
 \end{aligned}$$