

EE1002 Principles of Electrical Engineering
Assignment 1 --- Solution Summary

Q1

a) $a = -\frac{3}{2}$

b) $a = 6$

Q2

a) $z = 1 - 3j$

b) $\bar{z}_2 = 8 - 6j$

c) $a = -1, b = 3$ and $|z| = 10$

Q3

a) $2t$

b) $-3t^{-4}$

c) $-0.5t^{-3/2}$

d) $1/t$

e) $0.5t^{-1/2}$

f) $3e^{3t}$

g) $-5e^{-5t}$

h) $2\cos(2t + 3)$

i) $0.5\sec^2\left(\frac{t}{2} + 1\right)$

j) $\frac{1}{\sqrt{1-(t+\pi)^2}}$

Q4

a) $12x^2 - 10x$

b) $15\cos 5x + 8e^{4x}$

c) $6e^{3x} - 8\cos 2x$

d) $-\frac{3}{x^4} - 2.5\sin 5x$

e) $2x^2 + 2e^{4x}$

f) $0.5x^{-1/2} + \frac{1}{2x}$

Q5

[Hint: choose the interval $0 \leq t \leq 2$. The general equation for the straight line is $v = mt + c$.]

$v_{av} = 2.5$

Q6

$r.m.s = 0.707A$

Q7

- a) [Hint: let $x = a \sin t$]

$$\frac{\pi}{16} a^4$$

- b) [Hint: let $\sqrt{5-4x} = u$, then $x = \frac{5}{4} - \frac{1}{4}u^2$]

$$\frac{1}{6}$$

- c) [Hint: let $\sqrt{x} = t$]

$$2 + 2 \ln \frac{2}{3}$$

- d) [Hint: $x^4 \sin x$ is an odd function]

$$0$$

Q8

(a) $x = Ae^{2t}$

(b) $x = 3 \ln|1+t| + c$

(c) $y = \frac{1}{A - \sin x}$

Q9

[Hint: let $y = e^{kx}$]

a) $y = Ae^{2x} + Be^{-5x}$

b) $y(x) = C \cos 2x + D \sin 2x$

c) $y(x) = Ae^{-4x} + Bxe^{-4x}$

Q10

$$y = x \sin(x) - \frac{x \sin^3 x}{3} + Cx$$

Q11

The constant is 1, Both the numerator and denominator of the formula can be simplified to $\cos 2a$.

Q12

1. $f(x) = \sin\left(x + \frac{\pi}{2}\right) = \cos(x)$ in which $A = 1$ and $\phi = \frac{\pi}{2}$

2. $f(\alpha - \beta) = \cos(\alpha - \beta) = \cos(\alpha) \cos(\beta) + \sin(\alpha) \sin(\beta) = \frac{56}{65}$