Assignment #1
Applied Math for Electronics Engineering
201-943-DW
Solutions

Section 1.4

#20 $\left(\frac{F}{t}\right)^{20} = \boxed{\frac{F^{20}}{t^{20}}}$

#22 $\left(\frac{3}{n^3}\right)^{27} = \frac{3^3}{n^9} = \boxed{\frac{27}{n^9}}$

#24 $6v^0 = 6(1) = \boxed{6}$

#27 $6^{-1} = \boxed{\frac{1}{6}}$

#28 $-w^{-5} = \boxed{\frac{-1}{w^5}}$

#34 $-(-c^4)^{-4} = -\left(\frac{1}{(-c^4)^4}\right) = -\left(\frac{1}{c^{16}}\right) = \boxed{-\frac{1}{c^{16}}}$

#36 $2i^{40}i^{-70} = 2i^{-30} = \boxed{\frac{2}{i^{30}}}$

#38 $\frac{x^2x^3}{(x^2)^3} = \frac{x^5}{x^6} = \boxed{\frac{1}{x}}$

#40 $\frac{(3t)^{-1}}{3t^{-1}} = \frac{3^{-1}t^{-1}}{3t^{-1}} = \boxed{\frac{1}{9}}$

#44 $ax^{-2}(-a^2x)^3 = ax^{-2}(-a^6x^3)$

$= \boxed{-a^7x}$

SECTION 1.6

#5 $\sqrt{81} = \boxed{9}$

#7 $-\sqrt{121} = \boxed{-11}$

#9 $-\sqrt{49} = \boxed{-7}$

#11 $\sqrt{0.09} = \boxed{0.3}$

#13 $\sqrt[3]{125} = \boxed{5}$

#15 $\sqrt[3]{-216} = \boxed{-6}$

#17 $(\sqrt{5})^2 = \boxed{5}$

#19 $(-\sqrt[3]{-47})^3 = -(-47) = \boxed{47}$

#21 $(-\sqrt[4]{53})^4 = \boxed{53}$

#23 $\sqrt{1200}$

$= \sqrt{400 \cdot 3}$

$= \sqrt{400} \cdot \sqrt{3}$

$= \boxed{20\sqrt{3}}$

#25 $2\sqrt{89}$

$= 2\sqrt{4 \cdot 21}$

$= 2\sqrt{4} \cdot \sqrt{21}$

$= \boxed{4\sqrt{21}}$

#27 $\sqrt{\frac{80}{7-3}} = \sqrt{\frac{80}{4}} = \sqrt{20}$

$= \sqrt{5}\sqrt{4}$

$= \boxed{2\sqrt{5}}$

#29 $\sqrt[3]{82}$

$= \sqrt[3]{64}$

$= \boxed{4}$

#31 $\frac{7^2\sqrt{81}}{3^2\sqrt{49}}$

$= \frac{7^2 \cdot 9}{3^2 \cdot 7}$

$= \boxed{7}$

#33 $\sqrt{36+64}$

$= \sqrt{100} = \boxed{10}$

#35 $\sqrt{3^2+9^2}$

$= \sqrt{90} = \sqrt{9 \cdot 10}$

$= \sqrt{9} \cdot \sqrt{10}$

$= \boxed{3\sqrt{10}}$

SECTION 1.7

#10 $x - 2y + 3x - y + z$

$= \boxed{4x - 3y + z}$

#20 $(4x - y) - (-2x - 4y)$

$= 4x - y + 2x + 4y$

$= \boxed{6x + 3y}$

#28 $-[(A-B)-(B-A)]$

$= -[A - B - B + A]$

$= -[2A - 2B]$

$= \boxed{-2A + 2B}$

#30 $3(-3-(a-4))$

$= 3(-3 - a + 4)$

$= 3(1-a)$

$= \boxed{3 - 3a}$

#32 $-2[-3(x-2y) + 4y]$

$= -2[-3x + 6y + 4y]$

$= -2[-3x + 10y]$

$= \boxed{6x - 20y}$

#40 $-\{-[-(x-2a)-b]-(a-x)\}$

$= -\{-[-x+2a-b]-a+x\}$

$= -\{x - 2a + b - a + x\}$

$= -\{2x - 3a + b\}$

$= \boxed{-2x + 3a - b}$

Section 1.8

#10 $6pq^3(3pq^2)^2$

$= 6pq^3 \cdot 9p^2q^4$

$= \boxed{54p^3q^7}$

#16 $a^2bc(2ac - 3b^2c)$

$= \boxed{2a^3bc^2 - 3a^2b^3c^2}$

#31 $(x-2y-4)(x-2y+4)$

$= x^2 - 2xy + 4x - 2xy + 4y^2 - 8y$
$\quad -4x + 8y - 16$

$= \boxed{x^2 - 4xy + 4y^2 - 16}$

#45 $2(x+8)^2$

$= 2(x^2 + 16x + 64)$

$= \boxed{2x^2 + 32x + 128}$

#47 $(2+x)(3-x)(x-1)$

$= (6 + x - x^2)(x-1)$

$= 6x + x^2 - x^3 - 6 - x + x^2$

$= \boxed{5x + 2x^2 - x^3 - 6}$

Section 1.9

#18 $\boxed{ax_2^2 + x_1^2 - 1}$

#21 $\boxed{\frac{1}{3a} - \frac{2b}{3a} + 1}$

#22 $\boxed{x^2 + 2a}$

#24 $\boxed{3b^2 - \frac{1}{a}}$

Section 1.10

#13 $3t+5=-4$

$3t=-9$

$\boxed{t=-3}$

#15 $5-2y=-3$

$-2y=-8$

$\boxed{y=4}$

#17 $3x+7=x$

$2x=-7$

$\boxed{x=-7/2}$

#19 $2(s-4)=s$

$2s-8=s$

$\boxed{s=8}$

#21 $6-(r-4)=2r$

$6-r+4=2r$

$10=3r$

$\boxed{r=10/3}$

#23 $2(x-3)=-x$

$2x-6=-x$

$3x=6$

$\boxed{x=2}$

#25 $0.1x-0.5(x-2)=2$

$0.1x-0.5x+1=2$

$-0.4x=1$

$x=\frac{1}{-0.4}$

$\boxed{x=-2.5}$

#37 $\frac{x}{2}=\frac{17}{6}$

$x=\frac{34}{6}$

$\boxed{x=\frac{17}{3}}$

#38 $\frac{3}{7}=\frac{R}{42}$

$\frac{126}{7}=R$

$\boxed{R=18}$

Section 11.2

#39 $(8a^3b^6)^{1/3}$

$= \boxed{2ab^2}$

#40 $(8b^{-4}c^2)^{2/3}$

$= 8^{2/3} b^{-8/3} c^{4/3}$

$= \boxed{\dfrac{4c^{4/3}}{b^{8/3}}}$

#41 $(16a^4b^3)^{-3/4}$

$= 16^{-3/4} a^{-3} b^{-9/4}$

$= \dfrac{1}{16^{3/4} a^3 b^{9/4}}$

$= \boxed{\dfrac{1}{8a^3 b^{9/4}}}$

#42 $(32c^5D^4)^{-2/5}$

$= \dfrac{1}{32^{2/5} c^2 D^{8/5}}$

$= \boxed{\dfrac{1}{4c^2 D^{8/5}}}$

#43 $\left(\dfrac{a^{5/7}}{a^{2/3}}\right)^{7/4}$

$= \dfrac{a^{5/4}}{a^{14/12}}$

$= \dfrac{a^{15/12}}{a^{14/12}}$

$= \boxed{a^{1/12}}$

#44 $\left(\dfrac{4a^{5/6} b^{-1/5}}{a^{2/3} b^2}\right)^{-1/2}$

$= \dfrac{4^{-1/2} a^{-5/12} b^{1/10}}{a^{-1/3} b^{-1}}$

$= \dfrac{b^{1/10} b\, a^{1/3}}{4^{1/2} a^{5/12} a^{1/3}}$

$= \boxed{\dfrac{b^{11/10}}{2a^{1/12}}}$

#45 $\frac{1}{2}(4x^2+1)^{-1/2} 8x$

$= \dfrac{8x}{2(4x^2+1)^{1/2}}$

$= \boxed{\dfrac{4x}{(4x^2+1)^{1/2}}}$

Chapter 6 Review

#14 $7x - 28y$

$= \boxed{7(x-4y)}$

#18 $900n^a - n^{a+4}$

$= n^a(900 - n^4)$

$= \boxed{n^a(30-n^2)(30+n^2)}$

#22 $4x^2 - 12x + 9$

$= 4x^2 - 6x - 6x + 9$

$= 2x(2x-3) - 3(2x-3)$

$= \boxed{(2x-3)(2x-3)}$

#28 $3N^4 - 33N^2 + 30$

$= 3(N^4 - 11N^2 + 10)$

$= 3(N^2-10)(N^2-1)$

$= \boxed{3(N^2-10)(N+1)(N-1)}$

#30 $5x^2 + 2x - 3$

$= 5x^2 + 5x - 3x - 3$

$= 5x(x+1) - 3(x+1)$

$= \boxed{(x+1)(5x-3)}$

#32 $27F^3 + 21F^2 - 48F$

$= 3F(9F^2 + 7F - 16)$

$= 3F(9F^2 + 9F + 16F - 16)$

$= 3F[9F(F-1) + 16(F-1)]$

$= \boxed{3F(F-1)(9F+16)}$

#38 $8a^4 + 64a$

$= 8a(a^3 + 8)$

$= \boxed{8a(a+2)(a^2-2a+4)}$

#40 $R^3 - 125r^3$

$= \boxed{(R-5r)(R^2+5Rr+25r^2)}$

Chapter 7 Review

#26 $x^2+3x+1=0$

$$x=\frac{-3\pm\sqrt{9-4(1)}}{2}$$

$$=\frac{-3\pm\sqrt{5}}{2}$$

$x_1=-2.62 \quad x_2=-0.382$

#28 $3p^2=28-5p$

$3p^2+5p-28=0$

$3p^2+12p-7p-28=0$

$3p(p+4)-7(p+4)=0$

$(p+4)(3p-7)=0$

$p=-4 \quad p=7/3$

#30 $n-2=6n^2$

$6n^2-n+2=0$

$$n=\frac{1\pm\sqrt{1-4(6)(2)}}{2(6)}$$

NO SOLUTIONS

#32 $4y^2-5y-8=0$

$$y=\frac{5\pm\sqrt{(-5)^2-4(4)(-8)}}{2(4)}$$

$$=\frac{5\pm\sqrt{153}}{8}$$

$y_1=2.17 \quad y_2=-0.92$

#34 $16r^2=8r-1$

$16r^2-8r+1=0$

$16r^2-4r-4r+1=0$

$4r(4r-1)-(4r-1)=0$

$(4r-1)(4r-1)=0$

$r=1/4$

#46 $y = -4x^2 - 1$

vertex: $x = \frac{-b}{2a}$

$= 0 \qquad y = -1$

$(x, y) = (0, -1)$

x-intercepts: $y = 0$

$-4x^2 - 1 = 0$

$4x^2 + 1 = 0$

$4x^2 = -1$

$x^2 = -1/4$

No intercepts

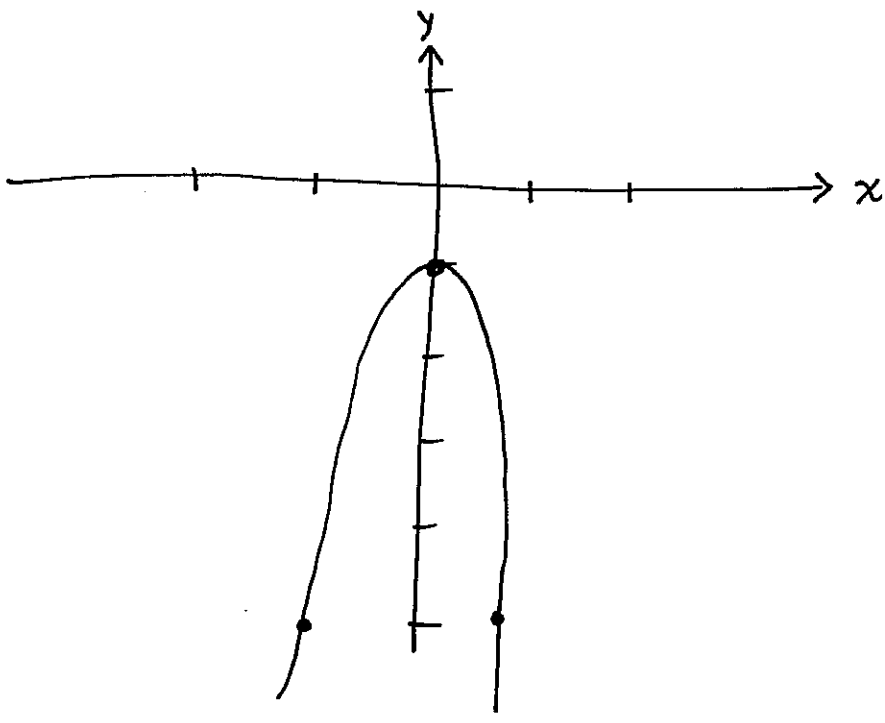
y-intercepts

$(0, -1)$

Two other points

$x = 1 \qquad y = -5$

$x = -1 \qquad y = -5$



#48 $y = 2x^2 + 8x - 10$

vertex $x = \frac{-b}{2a} = \frac{-8}{2(2)} = -2$

$y = 2(-2)^2 + 8(-2) - 10$

$= 2(4) - 16 - 10$

$= -18$

x-intercepts: $0 = 2x^2 + 8x - 10$

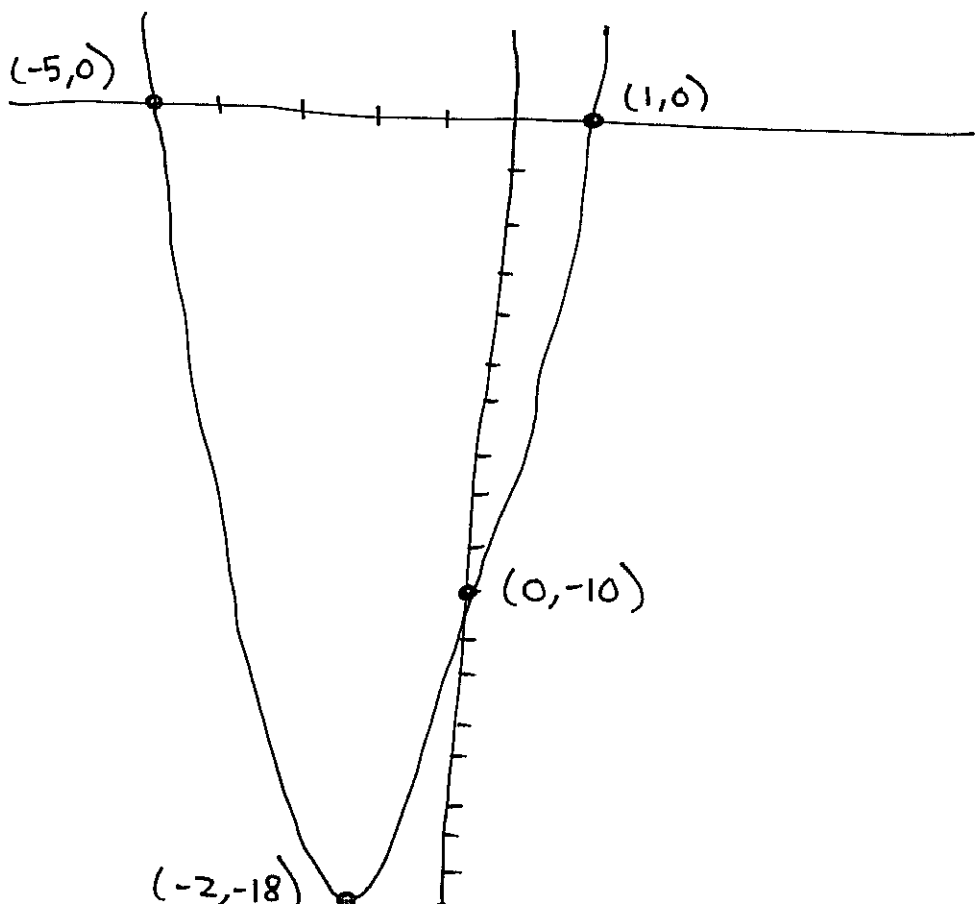
$= 2(x^2 + 4x - 5)$

$= 2(x+5)(x-1)$

$x = -5 \quad x = 1$

INTERCEPTS: (-5,0) & (1,0)

y-intercept: (0,-10)



Chapter 5 Review

#22 $2x-y=7$ (A)

$x+y=2$ (B)

$y=2x-7$ (A)

Sub in (B)

$x+2x-7=2$

$3x=9$

$x=3$

Sub in (A) $y=2x-7$

$y=2(3)-7$

$=-1$

$\boxed{x=3 \; ; \; y=-1}$

#24 $r=-3s-2$ (A)

$-2r-9s=2$ (B)

Sub (A) in (B)

$-2(-3s-2)-9s=2$

$6s+4-9s=2$

$-3s=-2$

$s=2/3$

sub in (A)

$r=-3(2/3)-2$

$=-2-2=-4$

$\boxed{r=-4 \; ; \; s=2/3}$

#50 $x+2y+z=2$ (A)

$3x-6y+2z=2$ (B)

$2x-z=8$ (C)

Isolate $z=$ (C)

$z=2x-8$

Sub in (A)

$x+2y+2x-8=2$

$3x+2y=10$ (A_2)

Sub in (B)

$3x-6y+2(2x-8)=2$

$7x-6y=18$ (B_2)

Solve system

$3x+2y=10$ (A_2)

$7x-6y=18$ (B_2)

Isolate y in (A_2)

$2y=10-3x$

$y=5-3/2x$

Sub in (B_2)

$7x-6(5-3/2x)=18$

$7x-30+9x=18$

$16x=48$

$\boxed{x=3}$

SUB $x=3$ in $y = 5 - \frac{3}{2}x$

$y = 5 - \frac{9}{2}$

$\boxed{y = \frac{1}{2}}$

SUB $x=3$, $y=\frac{1}{2}$ in : $z = 2x - 8$

$\boxed{z = -2}$

$\boxed{x = 3;\ y = \frac{1}{2};\ z = -2}$

#74 $i_1 + i_2 + i_3 = 0$ (A)

$5.2\, i_1 - 3.25\, i_2 = 1.88$ (B)

$3.25\, i_2 - 2.62 i_3 = -3.35$ (C)

ISOLATE i_1 in (B)

$5.2\, i_1 = 1.88 + 3.25\, i_2$

$i_1 = 0.36 + 0.625\, i_2$

SUB in (A)

$1.625\, i_2 + i_3 = -0.36$ (A2)

SUB in (C)

NOTHING TO SUB !

ISOLATE i_3 in (A2)

$i_3 = -0.36 - 1.625\, i_2 \longrightarrow$ SUB in (C)

$3.25\, i_2 - 2.62(-0.36 - 1.625 i_2) = -3.3$

$7.5075\, i_2 = -4.2932$

$\boxed{i_2 = -0.57}$

$i_3 = -0.36 - 1.625(-0.57)$

$\boxed{i_3 = 0.57}$

$\boxed{i_1 = 0}$

#77 Let x = Type I ore (6% copper)

y = Type II ore (2.4% copper)

$$x + y = 42 \quad (A)$$

$$0.06x + 0.024y = 2 \quad (B)$$

Isolate x in (A) & sub into (B)

$$0.06(42-y) + 0.024y = 2$$

$$2.52 - 0.06 + 0.024y = 2$$

$$-0.036y = -0.52$$

$y = 14.44$ tonnes

$x = 27.56$ tonnes

#86 Let x = Fuel Mix I (2% oil, 98% gas)

y = Fuel Mix II (8% oil, 92% gas)

$$x + y = 10 \quad (A)$$

$$0.02x + 0.08y = 0.04(10) \quad (B)$$

Isolate x in (A) & sub into (B)

$$0.02(10-y) + 0.08y = 0.4$$

$$0.2 - 0.02y + 0.08y = 0.4$$

$$0.06y = 0.2$$

$y = 3.33$ L

$x = 6.67$ L

Section 1.12

#14 Let x = weekly amount used in 8 weeks
y = weekly amount used in 6 weeks

$$y = x + 20000 \quad (A)$$

$$8x = 6y \quad (B)$$

Sub (A) in (B)

$$8x = 6(x + 20000)$$
$$8x = 6x + 120\,000$$
$$2x = 120\,000$$
$$x = 60\,000$$

Total amount in 8 weeks: $8 \cdot 60000 =$ **480,000 L**

#17 x = length of main pipeline

y = length of small pipelines

$$x + 2.6 = y \quad (A)$$

$$x + 3y = 35.4 \quad (B)$$

Sub (A) into (B)

$$x + 3(x + 2.6) = 35.4$$

$$4x + 7.8 = 35.4$$
$$4x = 27.6$$
$$x = 6.9$$

Main pipe line 6.9 Km, small pipelines 9.5 Km

#24 Done in class (see notes)

25 minutes until Appt.

28 Done in class (see notes)

6L must be added