MATH 1040/7040 ASSIGNMENT 5 SOLUTIONS

1a) $-24+2y^2=2y \Rightarrow 2y^2-2y-24=0$ $(\div 2)$

$\Rightarrow y^2-y-12=0$

$\Rightarrow (y-4)(y+3)=0$

$y=4, -3$

b) $-3z(2z-3)=0$

$\Rightarrow -3z=0$ or $2z-3=0$

$z=0$ $\quad$ $z=\frac{3}{2}$

c) $y=-4x^2+32x+36$

1) $0=-4x^2+32x+36$

$0=x^2-8x-9$

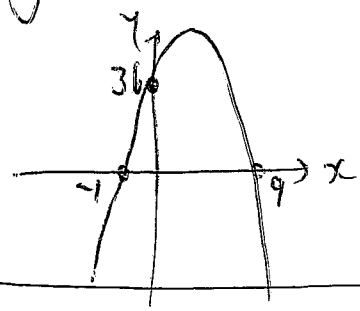
$0=(x+1)(x-9)$

$\Rightarrow x+1=0$ or $x-9=0$

$x=-1$ $\quad$ $x=9$

2) y-int. $= 36$

3)



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2. Let B = shoe price

I = amount needed to invest

$r=\frac{10}{100}\div 4 = 0.025$

$n = 21 \div 3 = 7$

$B = I(1+r)^n$

$400 = I(1+0.025)^7$

$I = \frac{400}{1.025^7} \simeq \$336.51$

$\therefore$ Peter will have to invest $\$336.51$.

3. Let B = bill cost
I = amount to invest now
$r = 2\% = 0.02$
$n = 13$

$B = Ie^{rn}$

$200 = Ie^{0.02 \times 13}$

$I = \frac{200}{e^{0.26}} \approx \$154.22.$

∴ Peter will have to invest $154.22.

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4. a) $\log_4 4^{-18} = -18$ as $4^{-18} = 4^{-18}$

b) $\log_4 4 = 1$ as $4^1 = 4$

c) $\log_4 \frac{1}{64} = -3$ as $4^{-3} = \frac{1}{64}$

d) $\log_{10} 100000 = 5$ as $10^5 = 100000$

e) $\log_{10} \frac{1}{10000} = -4$ as $10^{-4} = \frac{1}{10000}$

f) $\ln e^{-5} = -5$ as $e^{-5} = e^{-5}$

g) $\ln \frac{1}{e^{13}} = -13$ as $e^{-13} = \frac{1}{e^{13}}$

h) $\log_{25} 5 = \frac{1}{2}$ as $25^{\frac{1}{2}} = 5$

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6. a) $2x = 1$ [B]

b) $15y = -16x^2$ [S]

c) $6y = -18x$ [I]

d) $y = e^{7x}$ [K]

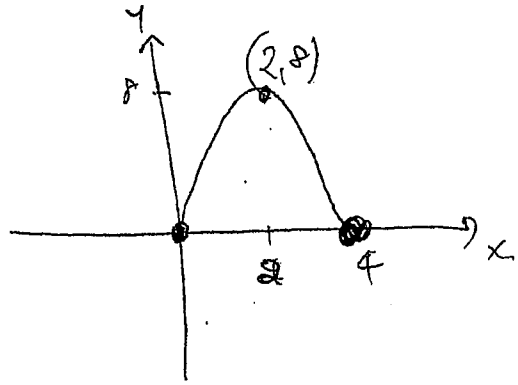
e) $y = 10x|10x|$ [N]

f) $y = -|15x|$ [M]

g) $15y = x^2$ [P]

h) $2y = -8x^2 - 2$ [T]

5. (a)



(b) $y = ax^2 + bx + c$

$(0,0) \Rightarrow 0 = a \times 0^2 + b \times 0 + c \Rightarrow c = 0.$

$(4,0) \Rightarrow 0 = 16a + 4b + 0 \Rightarrow 16a + 4b = 0 \quad (1)$

$(2,8) \Rightarrow 8 = 4a + 2b + 0 \Rightarrow 4a + 2b = 8 \quad (2)$

(c) Solve (1) and (2) simultaneously: $16a + 4b = 0 \quad (1) \quad 4a + 2b = 8 \quad (2)$

From $(2) \Rightarrow 2b = 8 - 4a \Rightarrow b = 4 - 2a$, substitute into $(1) \Rightarrow 16a + 4(4 - 2a) = 0 \Rightarrow 16a + 16 - 8a = 0 \Rightarrow 8a + 16 = 0 \Rightarrow 8a = -16 \Rightarrow a = -2$ and substitute into $(2) \Rightarrow 4 \times -2 + 2b = 8 \Rightarrow -8 + 2b = 8 \Rightarrow 2b = 16 \Rightarrow b = 8.$

Hence the equation is $y = -2x^2 + 8x$.

(d) $y = -4x + c$. Now $(4.5, 0)$ is on the line, so $0 = -4 \times 4.5 + c \Rightarrow c = 18$ and $y = -4x + 18$.

(e) $y = -4x + 18 \quad (1) \quad$ and $\quad y = -2x^2 + 8x \quad (2)$

We solve (1) and (2) simultaneously by equating y-values, so

$-4x + 18 = -2x^2 + 8x \Rightarrow -2x^2 + 12x - 18 = 0 \Rightarrow$

$$x = \frac{-12 \pm \sqrt{144 - 4 \times -2 \times -18}}{-4} = \frac{-12 \pm \sqrt{0}}{-4} = 3.$$

When $x = 3$, $y = -4 \times 3 + 18 = 6 \Rightarrow$ point is $(3, 6)$.