

(a) $x^2 + 3x - 28 = (x+7)(x-4) = 0 \Rightarrow x \in \{-7, 4\}$

10 pts

(b) $x^2 + 3x - 28$

$$\frac{28}{4} = 7$$

$$-\frac{9}{4} + \frac{112}{4} = \frac{121}{4}$$

$$= x^2 + 3x + \left(\frac{3}{2}\right)^2 - \frac{9}{4}$$

$$= \left(x + \frac{3}{2}\right)^2 - \frac{121}{4} = 0 \Rightarrow$$

$$\left(x + \frac{3}{2}\right)^2 = \frac{121}{4} \Rightarrow$$

$$x + \frac{3}{2} = \pm \sqrt{\frac{121}{4}} = \pm \frac{11}{2}$$

$$x = \frac{-3 \pm 11}{2} \begin{cases} \rightarrow \frac{8}{2} = 4 \\ \rightarrow \frac{-14}{2} = -7 \end{cases}$$

$$x \in \{-7, 4\}$$

10 pts

(c) $a=1, b=3, c=-28 \Rightarrow$

$$b^2 - 4ac = 3^2 - 4(1)(-28)$$

$$= 9 + 112 = 121 \rightarrow$$

$$x = \frac{-3 \pm \sqrt{121}}{2} = \frac{-3 \pm 11}{2} \begin{cases} \rightarrow 4 \\ \rightarrow -7 \end{cases}$$

$$x \in \{-7, 4\}$$

10 pts

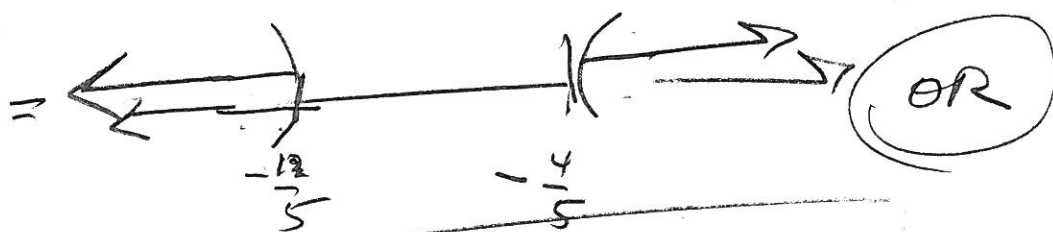
121 FINAL

(2) (a) $|-5x-8| > 4$

$$-5x-8 > 4 \quad \text{OR} \quad -5x-8 < -4$$

$$-5x > 12 \quad \text{OR} \quad -5x < +4$$

$$\left\{ x \mid x < \frac{12}{-5} \quad \text{OR} \quad x > -\frac{4}{5} \right\}$$



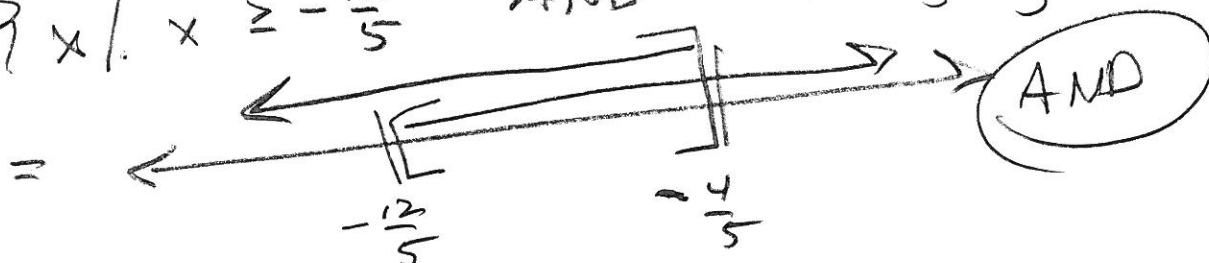
$$= \left[(-\infty, -\frac{12}{5}) \cup (-\frac{4}{5}, \infty) \right]$$

(b) $|-5x-8| \leq 4$

$$-5x-8 \leq 4 \quad \text{AND} \quad -5x-8 \geq -4$$

$$-5x \leq 12 \quad \text{AND} \quad -5x \geq +4$$

$$\left\{ x \mid x \geq -\frac{12}{5} \quad \text{AND} \quad x \leq -\frac{4}{5} \right\}$$



$$= \left[-\frac{12}{5}, -\frac{4}{5} \right]$$

121 FINAL Spring 17

(3) $f(x) = \sqrt{x+16}$, $g(x) = x^2 - 4x - 21$

(a) $D(f) = \{x \mid x \geq -16\} = [-16, \infty)$ (10 pts)

Need $x+16 \geq 0$

(b) $D(g) = \mathbb{R} = (-\infty, \infty) = \{x \mid x \in \mathbb{R}\}$ (10 pts)

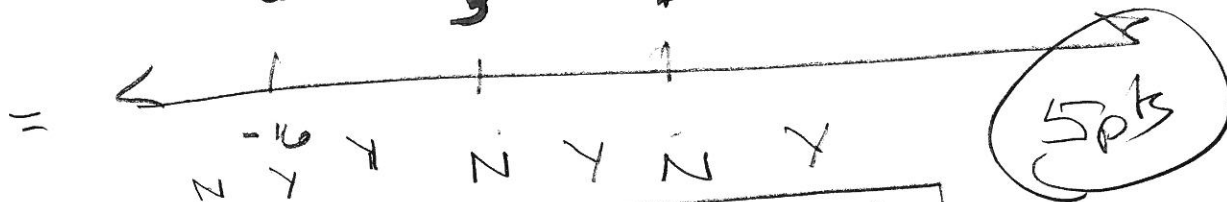
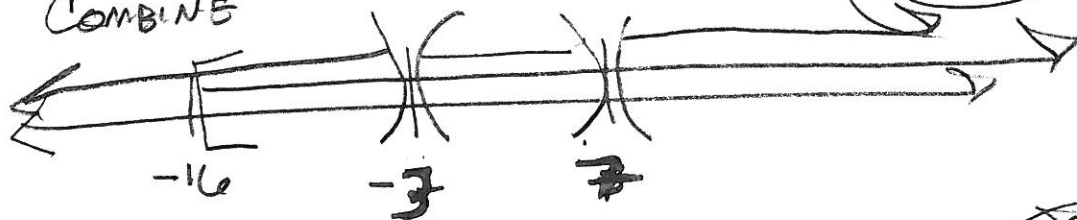
(c) $\left(\frac{f}{g}\right)(x) = \frac{\sqrt{x+16}}{x^2 - 4x - 21}$ (5 pts)

(d) Need $x^2 - 4x - 21 = (x-7)(x+3) \neq 0$

$\Rightarrow x \neq 7$ AND $x \neq -3$, ...

Need $x \geq -16$ for f .

COMBINE



$= [-16, -3) \cup (-3, 7) \cup (7, \infty)$
 $= \{x \mid x \geq -16 \text{ and } x \neq -3 \text{ and } x \neq 7\}$

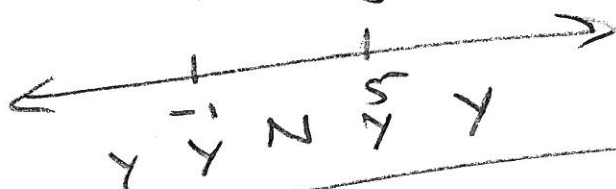
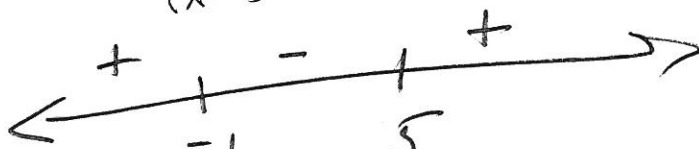
3 cont'd (d) $(f \circ g)(x) = \sqrt{x^2 - 4x - 21} + 16$

$$= \sqrt{x^2 - 4x - 5}$$

10pts

(e) Need $x^2 - 4x - 5 \geq 0$

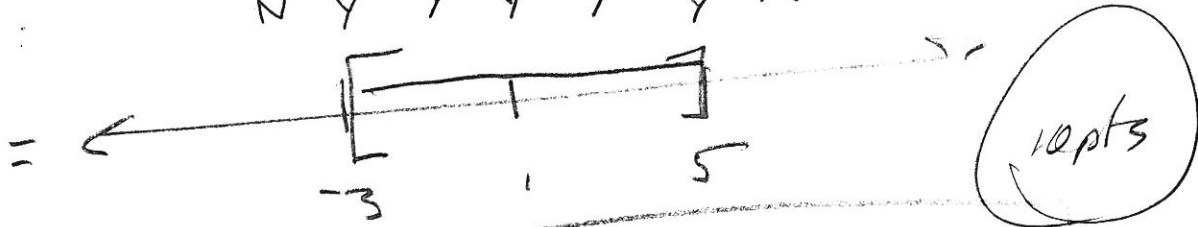
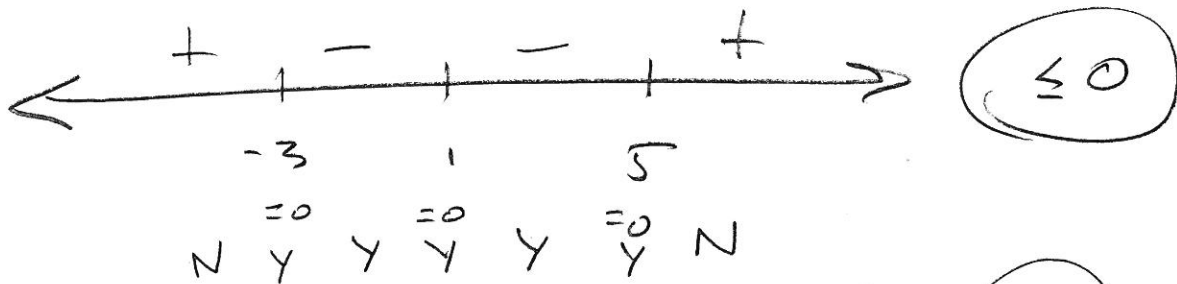
$$(x-5)(x+1) \geq 0$$



$$= (-\infty, -1] \cup [5, \infty)$$

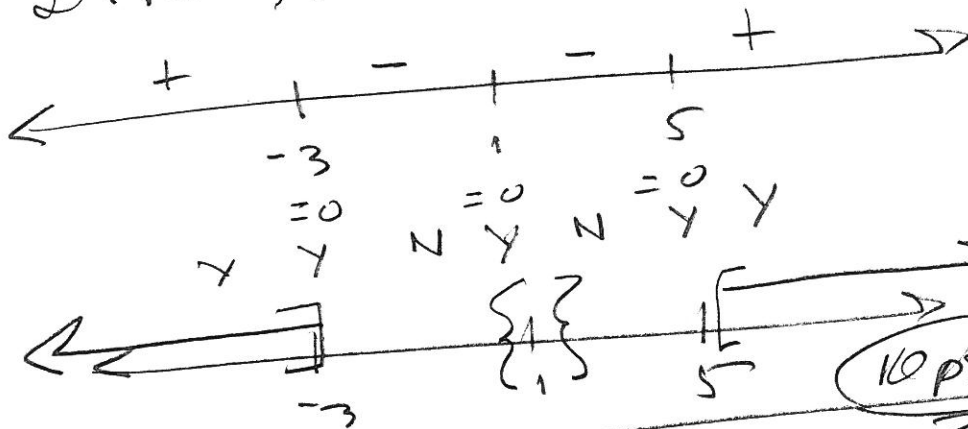
$$= \{x \mid x \leq -1 \text{ OR } x \geq 5\}$$

(4) $w(x) = (x+3)^{15}(x-1)^4(x-5) \leq 0$



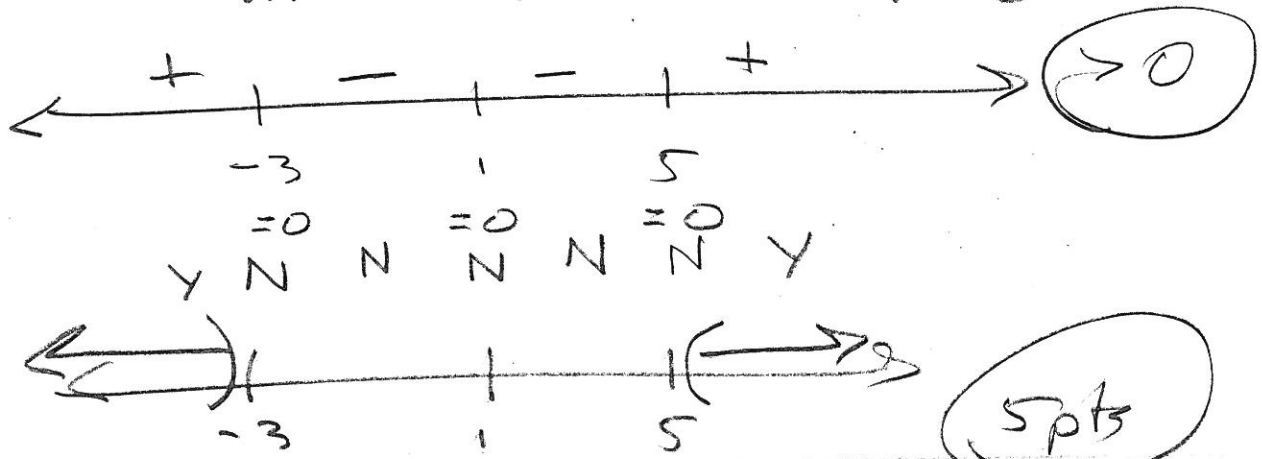
$= \{x \mid -3 \leq x \leq 5\} = [-3, 5]$

(5) $D(\sqrt{w(x)})$: Need $w(x) \geq 0$



$= \{x \mid x \leq -3 \text{ OR } x = 1 \text{ OR } x \geq 5\}$
 $= (-\infty, -3] \cup \{1\} \cup [5, \infty)$

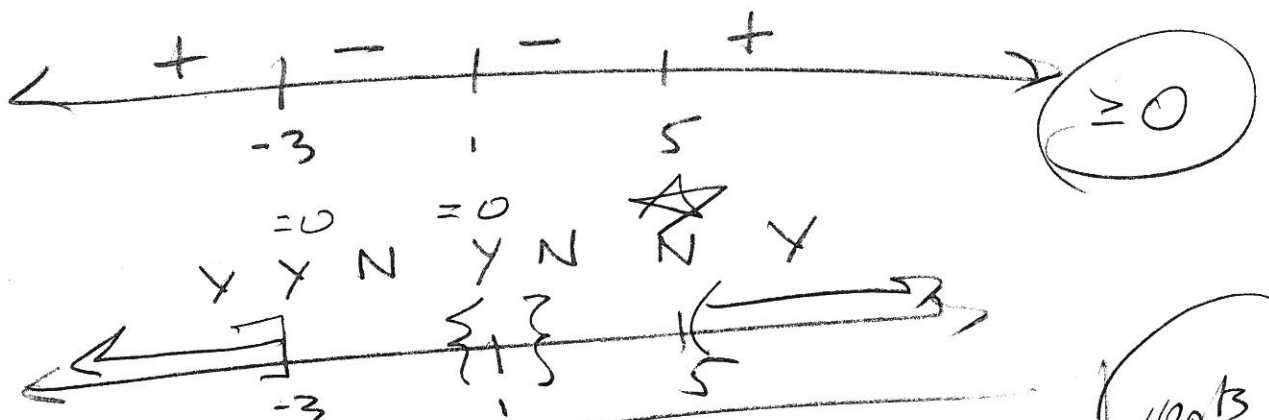
B2 $D(\log_{17}(w(x)))$ Need $w(x) > 0$



$$\{x \mid x < -3 \text{ OR } x > 5\} = (-\infty, -3) \cup (5, \infty)$$

6 $g(x) = \sqrt{\frac{(x+3)^{15}(x-1)^4}{x-5}} = \sqrt{r(x)}$

Need $r(x) \geq 0$



$$(-\infty, -3] \cup \{1\} \cup (5, \infty)$$

$$= \{x \mid x \leq -3 \text{ OR } x = 1 \text{ OR } x > 5\}$$

$$7) P(x) = 2x^5 - 5x^4 - 2x^2 + 6x - 13$$

$$P(2) = \begin{array}{r} 2 \overline{) 2 \quad -5 \quad 0 \quad -2 \quad 6 \quad -13} \\ \underline{ 4 \quad -2 \quad -4 \quad -12 \quad -12} \\ 2 \quad -1 \quad -2 \quad -6 \quad -6 \quad -25 = P(2) \end{array} \quad (10 \text{ pts})$$

8

$$\sum_{k=0}^n \dots, 10, n, 640$$

$$a = \frac{5}{2}, r = 2, n = 9$$

$$640 = \left(\frac{5}{2}\right) (2)^{n-1}$$

$$640 = 5 \cdot 2^7 = \frac{5}{2} \cdot 2^8 = \left(\frac{5}{2}\right) (2^{n-1})$$

$$\Rightarrow 8 = n-1 \Rightarrow n = 9$$

$$S_9 = a \left(\frac{1-r^n}{1-r} \right) = \frac{5}{2} \left(\frac{1-2^9}{1-2} \right)$$

$$= \frac{5}{2} \left(\frac{1-512}{-1} \right) = \frac{5}{2} \left(\frac{511}{1} \right) = \frac{2555}{2} = 1277.5$$

(10 pts)

$$\begin{array}{l} 2 \overline{) 640} \\ 2 \overline{) 320} \\ 2 \overline{) 160} \\ 2 \overline{) 80} \\ 2 \overline{) 40} \\ 2 \overline{) 20} \\ 2 \overline{) 10} \\ 5 \end{array}$$

$$\begin{array}{l} 5 \\ 2 \rightarrow 32 \\ 6 \rightarrow 164 \\ 7 \rightarrow 128 \\ 8 \rightarrow 256 \\ 9 \rightarrow 512 \end{array}$$

(9) $\sum_{k=1}^{\infty} 2 \left(\frac{3}{7}\right)^{k-1} = 2 \left(\frac{1}{1-\frac{3}{7}}\right) = 2 \left(\frac{1}{\frac{4}{7}}\right)$
 $= 2 \left(\frac{7}{4}\right) = \frac{7}{2} = 3.5$ (10 pts)

(10) $5000 \left(1 + \frac{.05}{52}\right)^{52(15)} \approx \8241.63 (10 pts)

Choose 112 or 116

(11) (a) $R = 950$, $t = 15$, $m = 12$, $r = .045$
 want present value.
 $P(1+i)^n \stackrel{SET}{=} R \left(\frac{(1+i)^n - 1}{i}\right) \Rightarrow$ (10 pts)

$P = R \left(\frac{1 - (1+i)^{-n}}{i}\right)$
 $= 950 \left(\frac{1 - \left(1 + \frac{.045}{12}\right)^{-12(15)}}{\frac{.045}{12}}\right)$

$\approx \$125,229.86$ Principal amount borrowed

Future Value Check:
 $125229.86 \left(1 + \frac{.045}{12}\right)^{(12)(15)} \approx \$245,645.25$ ✓
 $950 \left(\frac{\left(1 + \frac{.045}{12}\right)^{(12)(15)} - 1}{\frac{.045}{12}}\right) \approx \$245,645.25$

12) FINAL

11b

OPTION

$$\frac{1}{2} = 0.5 = 0.13 e^{20300k}$$

$$A_0 e^{20300k} = \frac{1}{2} A_0$$

$$20300k = \ln\left(\frac{1}{2}\right) = -\ln 2$$

$$k = \frac{-\ln 2}{20300}$$

10 pts

When does it reach 13g if it started at 100g?

$$E. \text{ then } A_0 e^{kt} = .13 A_0 \quad \text{or}$$

$$100 e^{kt} = 13$$

$$e^{kt} = \frac{13}{100}$$

$$kt = \ln\left(\frac{13}{100}\right)$$

$$t = \ln\left(\frac{13}{100}\right) / k$$

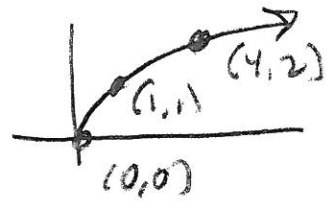
$$= \left(\ln\left(\frac{13}{100}\right)\right) \left(\frac{20300}{-\ln 2}\right)$$

$$\approx 59751.35437$$

$$\approx \boxed{59751 \text{ yrs}}$$

(12) $g(x) = -2\sqrt{-5x+40} + 7$

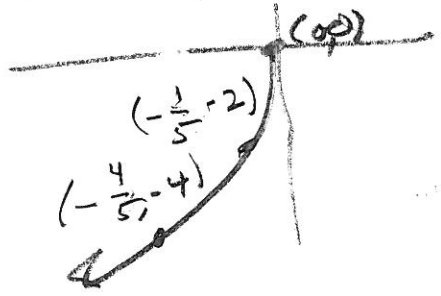
(1) $f(x) = \sqrt{x}$



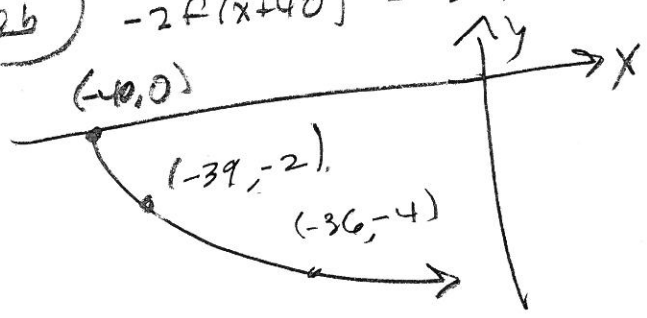
(1) $-2f(x) = -2\sqrt{x}$



(2a) $-2f(-5x) = -2\sqrt{-5x}$



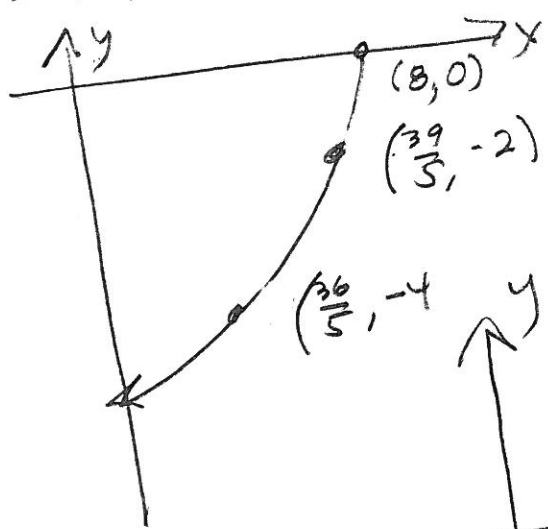
(2b) $-2f(x+40) = -2\sqrt{x+40}$



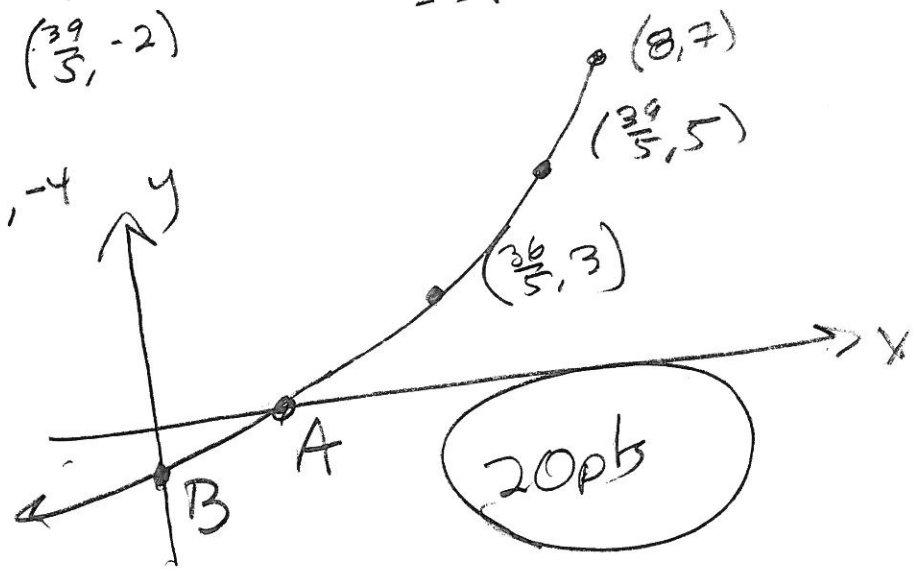
(3) $-2f(-5(x-8)) = -2f(-5x+40)$

$= -2\sqrt{-5x+40}$

$\frac{-40}{-5} = +8$ $\frac{-39}{-5}, \frac{-36}{-5}$



(4) $g(x)$ up 7 from (3)
 $-2\sqrt{-5x+40} + 7$



20pts

121 - Fin

12b

x-axis g(x) = 0

$$-2\sqrt{-5x+40} + 7 = 0$$

$$-2\sqrt{-5x+40} = -7$$

$$\sqrt{-5x+40} = \frac{7}{2}$$

$$-5x+40 = \frac{49}{4}$$

$$-5x = \frac{-160+49}{4} = -\frac{111}{4}$$

$$x = \frac{111}{20} \rightsquigarrow$$

$$A = \left(\frac{111}{20}, 0\right) = (5.55, 0)$$

5pts

12c

y-axis g(0) = -2\sqrt{40} + 7

$$= -2 \cdot 2\sqrt{10} + 7$$

$$= -4\sqrt{10} + 7$$

$$B = (0, -4\sqrt{10} + 7) \approx (0, -5.649110641)$$

5pts

BS

10pts!

Note!

10pts!

$$x + y + z = 4$$

$$y - z = 4$$

$$-3x + 2y - 7z = 7$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & 1 & -1 & 4 \\ -3 & 2 & -7 & 7 \end{array} \right] \xrightarrow{3R1+R3} \left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & 1 & -1 & 4 \\ 0 & 5 & -4 & 19 \end{array} \right]$$

$$\xrightarrow{-5R2+R3} \left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & 1 & -1 & 4 \\ 0 & 0 & 1 & -1 \end{array} \right]$$

$$\Rightarrow z = -1$$

$$\Rightarrow y - (-1) = 4$$

$$\Rightarrow y + 1 = 4$$

$$\Rightarrow y = 3$$

$$\Rightarrow x + 3 - 1 = 4$$

$$\Rightarrow x + 2 = 4$$

$$\Rightarrow x = 2$$

$$(x, y, z) \in \{ (2, 3, -1) \}$$

121 FN

(B6) Let $x = \#$ of hours Jon spends working.
 $\Rightarrow x+3 = \text{" " " " Bill " " " " .}$

John: 10 hrs
Bill: 7 hrs

$$\frac{1}{10}x + \frac{1}{7}(x+3) = 1$$

$$\frac{7x + 10(x+3)}{70} = \frac{70}{70}$$

$$7x + 10x + 30 = 70$$

$$17x = 40$$

$$x = \frac{40}{17}$$

$$\Rightarrow x+3 = \frac{40+51}{17}$$

$$= \frac{91}{17} = x+3$$

$$\frac{217}{357}$$

121 FIN

$$3x + 5y \leq 30$$

$$5x - 2y \leq 10$$

$$x \geq 0$$

$$y \geq 0$$

$$3x + 5y \leq 30$$

$$\begin{array}{r|l} x & y \\ \hline 0 & 6 \end{array}$$

$$10 \quad 0$$

$$0 \leq 30 \rightarrow$$

(0,0) GOOD

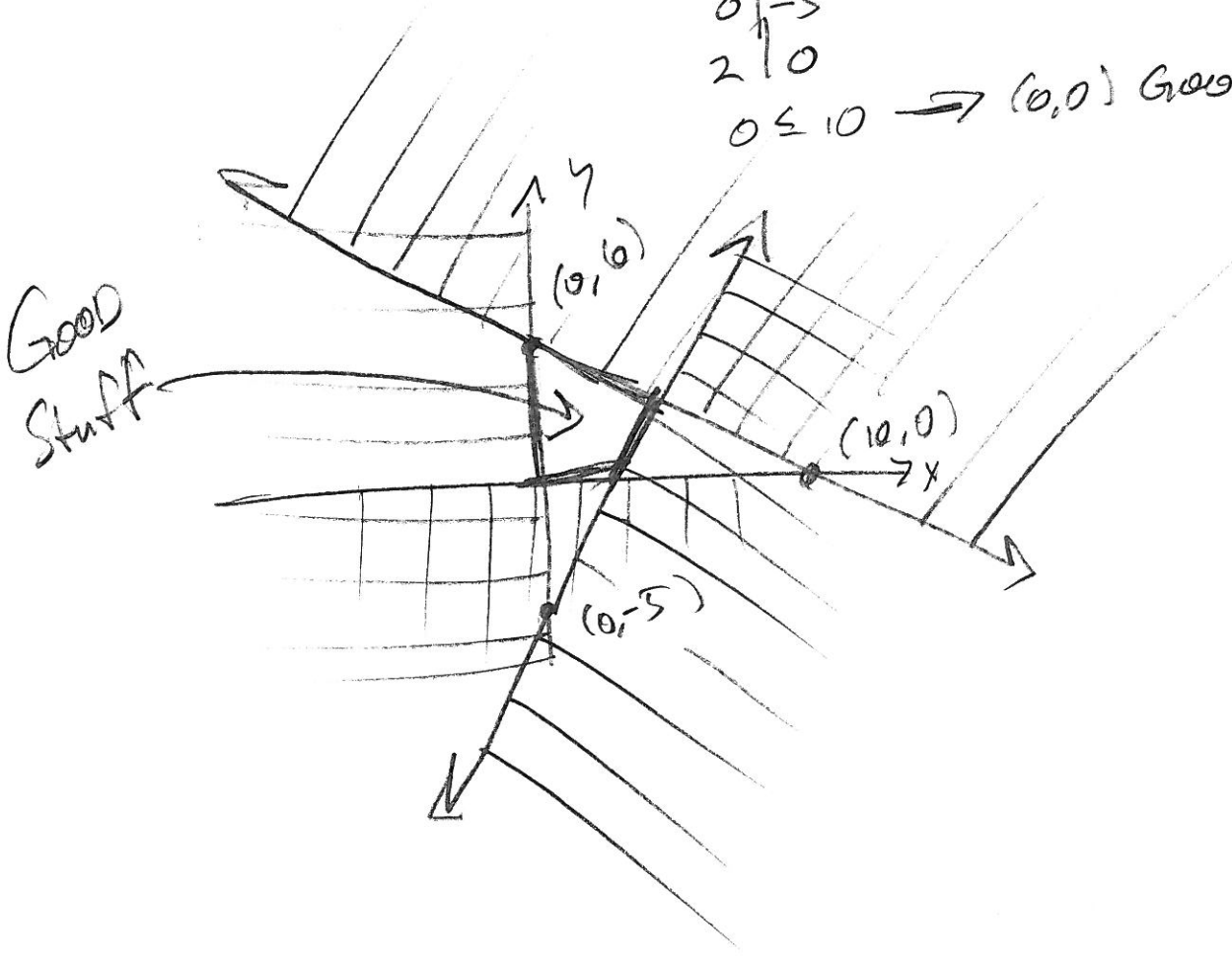
$$5x - 2y \leq 10$$

$$\begin{array}{r|l} x & y \\ \hline 0 & -5 \end{array}$$

$$2 \quad 0$$

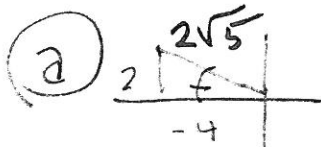
$$0 \leq 10 \rightarrow$$

(0,0) GOOD

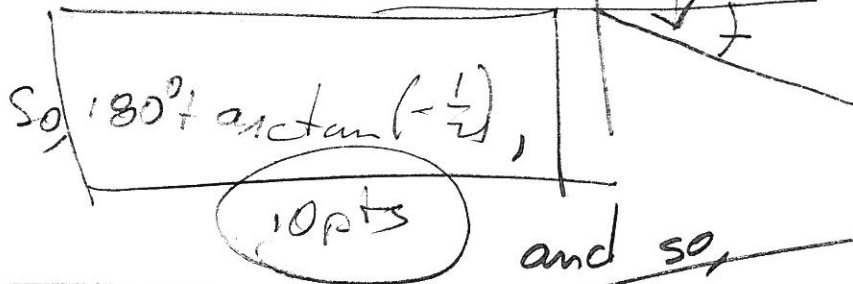


① $(x, y) = (-4, 2)$

$r = \sqrt{4^2 + 2^2} = \sqrt{20} = 2\sqrt{5}$



$\arctan(-\frac{1}{2})$



10 pts

and so,

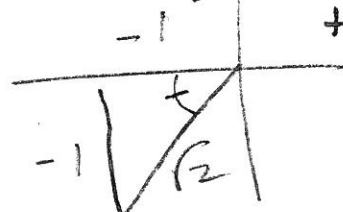
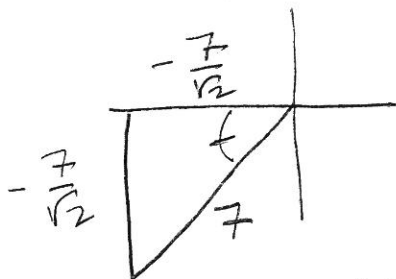
② $\approx 153.4349^\circ$ 10 pts

$(2\sqrt{5}, 180^\circ + \arctan(-\frac{1}{2}))$

is final ans. 2A

$(4.472135955, 153.4349)$
to 4 places, for b.

② $(r, \theta) = (7, \frac{5\pi}{4})$

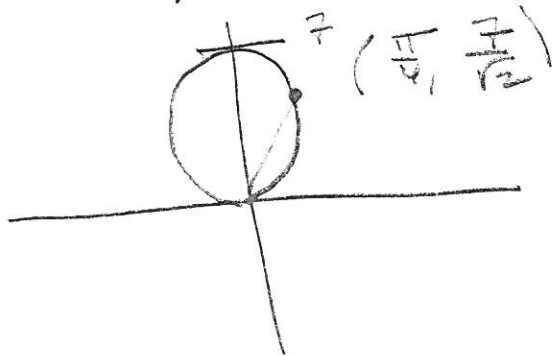
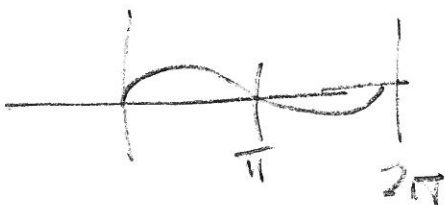


$\sqrt{2} \cdot \frac{7}{\sqrt{2}} = 7\sqrt{2}$ 10 pts

So, $(x, y) = (-\frac{7\sqrt{2}}{2}, -\frac{7\sqrt{2}}{2})$

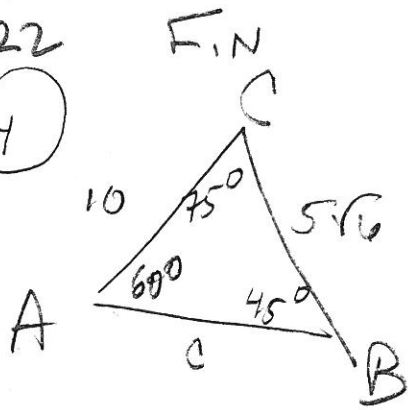
$\approx (-4.9497, -4.9497)$

③ $r = 7 \sin \theta$



122

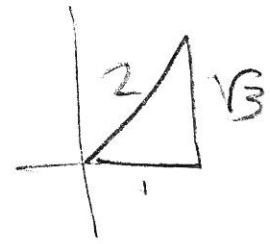
(4)



$$\frac{\sin B}{10} = \frac{\sin 60^\circ}{5\sqrt{6}}$$

$$= \frac{\sqrt{3}}{2} \cdot \frac{10}{5\sqrt{6}}$$

$$= \frac{1}{\sqrt{2}} \Rightarrow B = 45^\circ$$



$$\frac{c}{\sin C} = \frac{10}{\sin 45^\circ}$$

$$c = \frac{10 \sin 75^\circ}{\sin 45^\circ} \approx 13.66025404 \approx 13.66 \text{ mi} = c$$

$$c^2 = 150 + 100 - 2ab \cos 75^\circ \approx 13.66025404 \checkmark$$

Bonus -

10pts

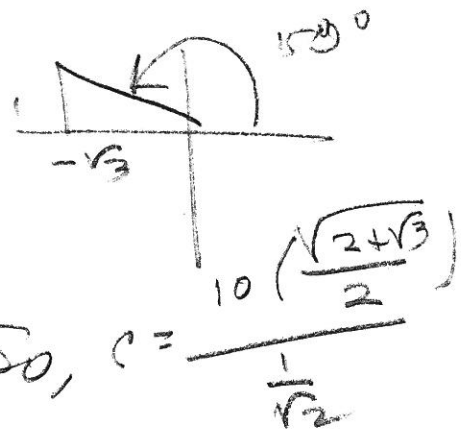
$$75 = \frac{2 \cdot 75}{2} = \frac{150}{2}$$

$$\sin 75^\circ = \sqrt{\frac{1 - \cos(150^\circ)}{2}} = \sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{2}} = \sqrt{\frac{2 + \sqrt{3}}{4}}$$

$$= \frac{\sqrt{2 + \sqrt{3}}}{2}$$

cleanest

$$\boxed{5\sqrt{4 + 2\sqrt{3}}}$$



$$\text{So, } c = \frac{10 \left(\frac{\sqrt{2 + \sqrt{3}}}{2} \right)}{\frac{1}{\sqrt{2}}}$$

$$= \frac{5\sqrt{2 + \sqrt{3}}}{\frac{1}{\sqrt{2}}} = \frac{10\sqrt{2}\sqrt{2 + \sqrt{3}}}{2}$$

$$= 5\sqrt{2}\sqrt{2 + \sqrt{3}}$$

20pts

$$13.66 \text{ mi} = c$$

$$75^\circ = C$$

$$45^\circ = B$$

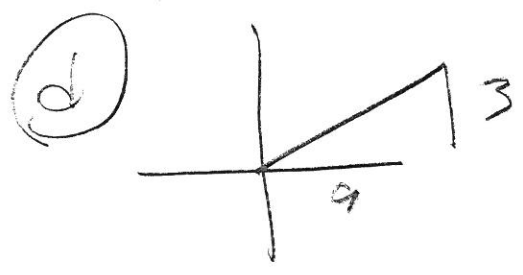
5) $\vec{u} = \langle 4 - (-5), -1 - (-4) \rangle$

a) $\vec{u} = \langle 9, 3 \rangle = \vec{u}$ (10 pts)

$$\begin{array}{r} 2 \overline{) 90} \\ 3 \overline{) 45} \\ 3 \overline{) 15} \end{array}$$

b) $\|\vec{u}\| = \sqrt{9^2 + 3^2} = \sqrt{81 + 9} = \sqrt{90} = 3\sqrt{10} = \|\vec{u}\|$ (10 pts)

c) $\vec{u} = 9\vec{i} + 3\vec{j}$ (10 pts) ≈ 9.486832981



$$\begin{aligned} \theta &= \arctan\left(\frac{3}{9}\right) \\ &= \arctan\left(\frac{1}{3}\right) \end{aligned}$$

$$\approx 18.43494882^\circ$$

$$\approx 18.4349^\circ \approx \theta$$

Bonus! sum identity

$$75^\circ = 30^\circ + 45^\circ$$

$$\begin{aligned} \sin(75^\circ) &= \sin 30^\circ \cos 45^\circ + \sin 45^\circ \cos 30^\circ \\ &= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{2}\right) = \frac{\sqrt{3} + 1}{2\sqrt{2}} = \frac{\sqrt{6} + \sqrt{2}}{4} \end{aligned}$$

$$\text{so, } C = \frac{10 \sin 75^\circ}{\sin 45^\circ} = \frac{10 \left(\frac{\sqrt{6} + \sqrt{2}}{4}\right)}{\frac{1}{\sqrt{2}}} = \frac{5(\sqrt{6} + \sqrt{2}) \left(\frac{\sqrt{2}}{1}\right)}{5(2\sqrt{3} + 2)} = 5(\sqrt{3} + 1)$$

6 $f(x) = 2x^3 - 19x^2 + 62x - 70$

7
$$\begin{array}{r|rrrr} 3+i & 2 & -19 & 62 & -70 \\ & & 6+i & -41-7i & 70 \\ \hline 3-i & 2 & -13+2i & 21-7i & 0 \\ & & 6-2i & 21-7i & \\ \hline & 2 & -7 & 0 & \end{array}$$

See 3 10pts

$(-13+2i)(3+i)$

$-39-13i+6i-2$

$= -41-7i$

$21-7i = 7(3-i)$

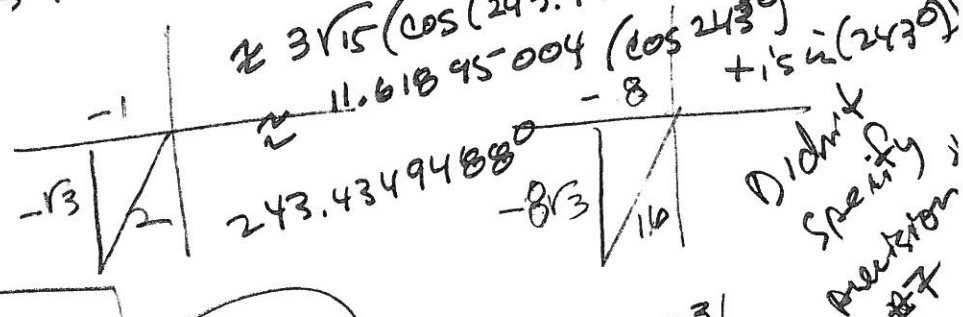
8 So, $f(x) = (2x-7)(x-3-i)(x-3+i)$ $7(3+i)(3-i) = 7(9+1) = 70$

10pts

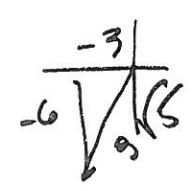
9 $-3-6i$: $\theta = \arctan(2)$, $r = \sqrt{45} = 3\sqrt{5}$
 $z = (3\sqrt{5})(\cos(\pi + \arctan(2)) + i \sin(\pi + \arctan(2)))$ 10pts

10 $z = 16 \left(\cos\left(-\frac{2\pi}{3}\right) + i \sin\left(-\frac{2\pi}{3}\right) \right)$
 $z = 3\sqrt{15} (\cos(243.43^\circ) + i \sin(243.43^\circ))$

11 $r = 16$, $\theta = -\frac{2\pi}{3}$



$z = -8 - 8\sqrt{3}i$
 $z \approx -8 - 13.9564064i$ 10pts



12 $\sqrt[4]{z} = \sqrt[4]{16} \left(\cos\left(-\frac{\pi}{6}\right) + i \sin\left(-\frac{\pi}{6}\right) \right)$
 $= 2 \left(\cos\left(-\frac{\pi}{6}\right) + i \sin\left(-\frac{\pi}{6}\right) \right) = \sqrt[4]{z}$

$\frac{-2\pi/3}{4} = -\frac{\pi}{6}$

10pts

(8) (1) $\frac{2\pi}{4} = \frac{\pi}{2}$

(2) $w = 2(\cos(\frac{\pi}{6}) + i\sin(\frac{\pi}{6}))$

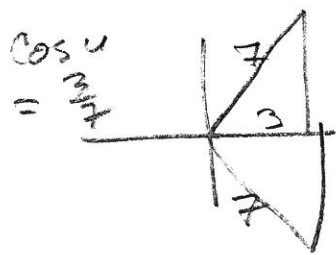
$-\frac{\pi}{6} + \frac{3\pi}{6} = \frac{2\pi}{6} = \frac{\pi}{3}$
 $\frac{2\pi}{6} + \frac{3\pi}{6} = \frac{5\pi}{6}$
 $\frac{5\pi}{6} + \frac{3\pi}{6} = \frac{8\pi}{6} = \frac{4\pi}{3}$
 $\frac{4\pi}{6} + \frac{3\pi}{6} = \frac{7\pi}{6}$

$2w = 32(\cos(-\frac{\pi}{2}) + i\sin(-\frac{\pi}{2}))$
 $= -32i!$
 $-\frac{2\pi}{3} = -\frac{4\pi}{6}$
 $-\frac{4\pi}{6} + \frac{\pi}{6} = -\frac{3\pi}{6} = -\frac{\pi}{2}$

$2(\cos(\frac{\pi}{3}) + i\sin(\frac{\pi}{3}))$
 $2(\cos(\frac{5\pi}{6}) + i\sin(\frac{5\pi}{6}))$
 $2(\cos(\frac{4\pi}{3}) + i\sin(\frac{4\pi}{3}))$

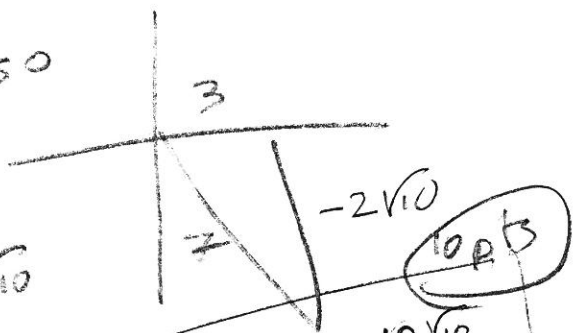
10 pts

(9) $\cos u = \frac{3}{7}$ & $\sin(u) < 0$



$\sin u < 0$, so

$49 - 9 = 40$
 $\sqrt{40} = 2\sqrt{10}$



$\sin(2u) = 2\sin u \cos u$

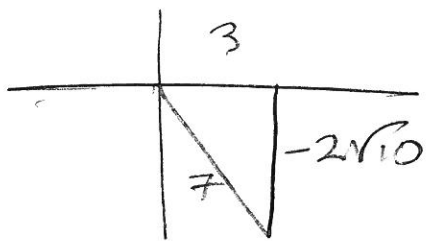
$= 2(-\frac{2\sqrt{10}}{7})(\frac{3}{7}) = -\frac{12\sqrt{10}}{49} = \sin(2u)$

$\tan(2u) = \frac{12\sqrt{10}}{31}$

$\cos(2u) = 2\cos^2 u - 1 = 2(\frac{3}{7})^2 - 1 = \frac{18 - 49}{49} = -\frac{31}{49} = \cos(2u)$

(10)

$$\cos u = \frac{3}{7}, \quad 270^\circ < u < 360^\circ$$



$$270^\circ < u < 360^\circ$$

$$\text{So } 135^\circ < \frac{u}{2} < 180^\circ$$

This is Q II

$$\frac{3\pi}{2} < u < 2\pi \rightarrow$$

$$\frac{3\pi}{4} < \frac{u}{2} < \pi \rightarrow \text{Q II}$$



$$\sin \frac{u}{2} = \sqrt{\frac{1 - \cos(u)}{2}} = \sqrt{\frac{1 - \frac{3}{7}}{2}} = \sqrt{\frac{\frac{4}{7}}{2}}$$

$$= \sqrt{\frac{4}{14}} = \sqrt{\frac{2}{7}} = \sin\left(\frac{u}{2}\right)$$

.5345224838

$$\cos \frac{u}{2} = -\sqrt{\frac{1 + \cos u}{2}} = -\sqrt{\frac{1 + \frac{3}{7}}{2}} = -\sqrt{\frac{\frac{10}{7}}{2}}$$

$$= -\sqrt{\frac{5}{7}} = \cos\left(\frac{u}{2}\right)$$

10 pts

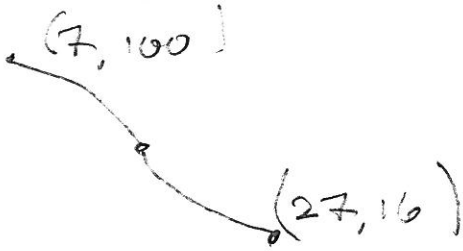
$$\text{So } \tan\left(\frac{u}{2}\right) = \sqrt{\frac{2}{7} \cdot \frac{7}{5}} = \sqrt{\frac{2}{5}} = \tan\left(\frac{u}{2}\right)$$

.632455532

122

FIN

(11)

start $x=7$

$$\frac{\text{High} - \text{Low}}{2} = \frac{100 - 16}{2} = \frac{84}{2} = \text{Amp} = 42$$

$$\frac{\text{High} + \text{Low}}{2} = \frac{116}{2} = 58 = \text{midline}$$

Period: $27 - 7 = 20$ is $\frac{1}{2}$ -period

$$f(x) = 42 \cos\left(\frac{\pi}{20}(x-7)\right) + 58$$

Check: $T=40$?

$$bx = 2\pi \text{ when } x=40$$

$$40b = 2\pi$$

$$b = \frac{2\pi}{40} = \frac{\pi}{20} \checkmark$$

122 FIN

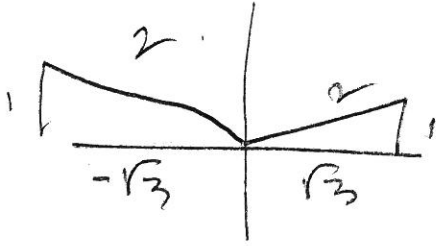
B2

$$2 \sin(2x) - 1 = 0$$

$$0 \leq x < 2\pi$$

$$\sin(2x) = \frac{1}{2}$$

$$0 \leq 2x < 4\pi$$



$$2x = \frac{\pi}{6}$$

$$2x = \frac{5\pi}{6}$$

$$2x = \frac{13\pi}{6}$$

$$x = \frac{\pi}{12}$$

$$x = \frac{5\pi}{12}$$

$$x = \frac{13\pi}{12}$$

$$2x = \frac{17\pi}{6}$$

$$x = \frac{17\pi}{12}$$

$$S_0, x \in \left\{ \frac{\pi}{12}, \frac{5\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12} \right\}$$

B*

122
B2

FIN

(B2)

$$f(\theta) = 11 \sin\left(\frac{\pi}{14}\left(\theta - \frac{26\pi}{7}\right)\right) + 4$$

$$\left(\frac{26\pi}{7}\right) \left(\frac{14}{\pi}\right) = 52$$

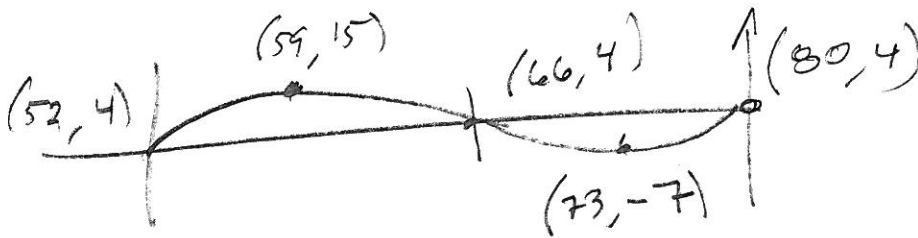
$$11 \sin\left(\frac{\pi}{14}(\theta - 52)\right) + 4$$

$$T = 14 \cdot 2 = 28?$$

$$\frac{\pi}{14}x = 2\pi \text{ when?}$$

$$\frac{28}{4} = 7$$

$$x = 28 \checkmark$$



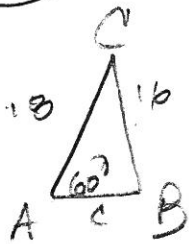
(B3)

(a)

$$h = 18 \sin 60^\circ = \frac{18\sqrt{3}}{2} = 9\sqrt{3} \approx 15.58845727$$

$$h \approx 15.6 < 16 = a < 18 = b \checkmark$$

SpB



(b)

$$\frac{\sin B}{18} = \frac{\sin 60^\circ}{16} \Rightarrow \sin B = \frac{9\sqrt{3}}{16}$$

$$= \frac{9\sqrt{3}}{16} \Rightarrow \boxed{76.97671882 \approx B}$$

$$\text{Other } B: \boxed{180^\circ - B \approx 103.0232812}$$



D.S.