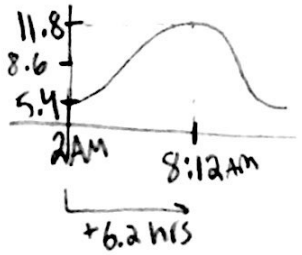
Standard 2.02 Key

① A) 

$h(t) = 3.2\cos\left[\frac{5\pi}{31}(t+6.2)\right] + 8.6$

↑ instead of 1 we have height of 3.2

↑ cosine starts above

↑ instead of 0 we have midline at 8.6

Period: $\frac{2\pi}{b} = pd$

$\frac{2\pi}{b} = 12.4$ hrs,

$\frac{5\pi}{31} = b$

B) $h(t) = 3.2\cos\left(\frac{5\pi}{31}(t+6.2)\right) + 8.6$ *radian mode*

4 AM → $t = 2$ hours

$h(t) = 3.2\cos\left(\frac{5\pi}{31}\cdot 2 + 6.2\right) + 8.6$

$h(t) = 10.5$ feet

② $f(x) = -\frac{1}{2}\sin\left(\frac{\pi}{6} - 3x\right) = -\frac{1}{2}\sin(-3x + \frac{\pi}{6}) = -\frac{1}{2}\sin(-3(x - \frac{\pi}{18}))$

Amp: $\frac{1}{2}$ Pd: $\frac{2\pi}{b} = \frac{2\pi}{-3} = -\frac{2\pi}{3}$ P.S.: right $\frac{\pi}{18}$

③ $2\cdot\sin.5x = .75$

$\sin.5x = .375$

$.5x = \sin^{-1}\left(\frac{3}{8}\right)$ *degree mode

$\frac{.5x}{.5} = \frac{22.02}{.5}$

$x = 44.05$

④ $\sin 2x - \tan x = 0$

$2\sin x\cos x - \frac{\sin x}{\cos x} = 0$

$\frac{2\sin x\cos^2 x}{\cos x} - \frac{\sin x}{\cos x} = 0$

$\frac{\sin x}{\cos x}(2\cos^2 x - 1) = 0$

$\frac{\sin x}{\cos x} = 0$ $2\cos^2 x - 1 = 0$

$\sin x = 0$ $2\cos^2 x = 1$

$\cos^2 x = \frac{1}{2}$

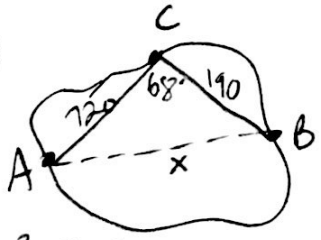
$\cos x = \pm\sqrt{\frac{1}{2}}$

$\cos x = \pm\frac{1}{\sqrt{2}}$

$\cos x = \pm\frac{\sqrt{2}}{2}$

$x = 0, \pi$

$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

⑤ 

$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 720^2 + 190^2 - 2(720)(190)\cos 68°$

$a^2 = 452007.636$

$a = 672.32$ feet

⑥ $2\sin^2\theta - \sin\theta - 3 = 0$

$2x^2 - x - 3$

factor-slide-divide

$x^2 - x - 6$

$\frac{(x-3)}{2}\frac{(x+2)}{2} = 0$

$(2x-3)(x+1) = 0$

$2\sin\theta - 3 = 0$ $\sin\theta + 1 = 0$

$2\sin\theta = 3$ $\sin\theta = -1$

$\sin\theta = 3/2$ not on unit circle

$\theta = \frac{3\pi}{2}$

⑦ $\sin\left(\frac{7\pi}{12}\right) = \sin\left(\frac{3\pi}{12} + \frac{4\pi}{12}\right)$

$= \sin\left(\frac{\pi}{4} + \frac{\pi}{3}\right)$

$= \sin\left(\frac{\pi}{4}\right)\cos\left(\frac{\pi}{3}\right) + \cos\left(\frac{\pi}{4}\right)\sin\left(\frac{\pi}{3}\right)$

$= \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right)$

$= \frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4}$

$= \frac{\sqrt{2}+\sqrt{6}}{4}$

(8) $\frac{\cos x}{1+\sin x} = \sec x + \tan x$

$= \frac{1}{\cos x} - \frac{1}{\cot x}$

$= \frac{\cot x}{\cos x \cot x} - \frac{\cos x}{\cos x \cot x}$

$= \frac{\cot x - \cos x}{\cos x \cot x}$

$= \frac{\cot x - \cos x}{\cos x \cdot \frac{\cos x}{\sin x}}$

$= \frac{\cot x - \cos x}{\frac{\cos^2 x}{\sin x}}$

$= \frac{\frac{\cos x}{\sin x} - \cos x}{\frac{\cos^2 x}{\sin x}}$

$= \frac{\frac{\cos x}{\sin x} - \frac{\cos x \sin x}{\sin x}}{\frac{\cos^2 x}{\sin x}}$

$= \frac{\frac{\cos x - \cos x \sin x}{\sin x}}{\frac{\cos^2 x}{\sin x}}$

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

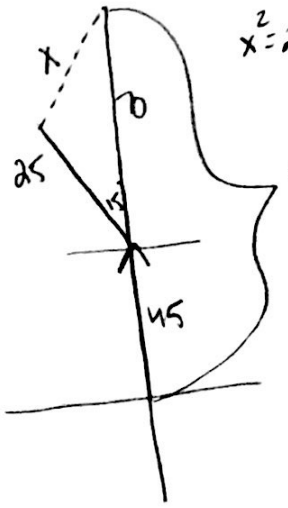
$= \frac{\cos x(1-\sin x)}{\sin x} \cdot \frac{\sin x}{\cos^2 x}$

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

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

$= \frac{\cos x(1-\sin x)}{(1+\sin x)(1-\sin x)} \rightarrow \frac{\cos x}{1+\sin x}$ ✓

(9)



$x^2 = 25^2 + 70^2 - 2(25)(70)\cos 15$

$x^2 = 2144.26$

$x = 46.31 \text{ mi}$

(10 A) $\sin\theta(\cot\theta + \tan\theta) = \sec\theta$

$\sin\theta\left(\frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\cos\theta}\right) =$

$\frac{\sin\theta\cos\theta}{\sin\theta} + \frac{\sin^2\theta}{\cos\theta} =$

$\frac{\sin\theta\cos^2\theta}{\sin\theta\cos\theta} + \frac{\sin^3\theta}{\sin\theta\cos\theta} =$

$\frac{\sin\theta\cos^2\theta + \sin^3\theta}{\sin\theta\cos\theta} =$

$\frac{\sin\theta(\cos^2\theta + \sin^2\theta)}{\sin\theta\cos\theta} =$

$\frac{1}{\cos\theta} =$

$\sec\theta = \sec\theta$ ✓

(10) B) $\sec^4\theta - \sec^2\theta = \tan^4\theta + \tan^2\theta$

$(\sec^2\theta - \sec\theta)(\sec^2\theta + \sec\theta) =$

$\sec\theta(\sec\theta - 1)\sec\theta(\sec\theta + 1) =$

$\sec^2\theta(\sec\theta - 1)(\sec\theta + 1) =$

$\sec^2\theta(\sec^2\theta - 1) =$

$(1 + \tan^2\theta)(\tan^2\theta) =$

$\tan^2\theta + \tan^4\theta =$

$\tan^4\theta + \tan^2\theta = \tan^4\theta + \tan^2\theta$ ✓

C) $\dfrac{\cos(\alpha - \beta)}{\cos\alpha\cos\beta} = 1 + \tan\alpha\tan\beta$

$\dfrac{\cos\alpha\cos\beta + \sin\alpha\sin\beta}{\cos\alpha\cos\beta} =$

$\dfrac{\cos\alpha\cos\beta}{\cos\alpha\cos\beta} + \dfrac{\sin\alpha\sin\beta}{\cos\alpha\cos\beta} =$

$1 + \tan\alpha\tan\beta = 1 + \tan\alpha\tan\beta$ ✓

D) $\cos^4\theta - \sin^4\theta = \cos(2\theta)$

$(\cos^2\theta - \sin^2\theta)(\cos^2\theta + \sin^2\theta) =$

$(\cos^2\theta - (1 - \cos^2\theta))(1) =$

$(\cos^2\theta - 1 + \cos^2\theta) =$

$2\cos^2\theta - 1 =$

$\cos 2\theta = \cos 2\theta$ ✓

(11) A) $367^\circ \cdot \dfrac{\pi}{180} = \dfrac{367\pi}{180}$

B) $-48.5 \cdot \dfrac{\pi}{180} = -\dfrac{97\pi}{360}$

C) $5916^\circ \cdot \dfrac{\pi}{180} = \dfrac{149\pi}{45}$

(12) A) $\dfrac{-5\pi}{19} \cdot \dfrac{180}{\pi} = -47.37^\circ$

B) $\dfrac{62\pi}{7} \cdot \dfrac{180}{\pi} = 1594.29^\circ$

C) $\dfrac{3\pi}{20} \cdot \dfrac{180}{\pi} = 27^\circ$

(13) A) $103^\circ + 360 = 463^\circ$

$-360 = -257^\circ$

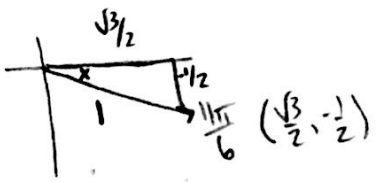
B) $\dfrac{3\pi}{8} + \dfrac{16\pi}{8} = \dfrac{19\pi}{8}$

$-\dfrac{16\pi}{8} = -\dfrac{13\pi}{8}$

C) $-\dfrac{14\pi}{11} + \dfrac{22\pi}{11} = \dfrac{8\pi}{11}$

$-\dfrac{22\pi}{11} = \dfrac{-36\pi}{11}$

(14) A) $\dfrac{11\pi}{6}$



$\sin x = -\dfrac{1}{2}$ $\quad \csc x = -2$

$\cos x = \dfrac{\sqrt{3}}{2}$ $\quad \sec x = \dfrac{2}{\sqrt{3}}$ or $\dfrac{2\sqrt{3}}{3}$

$\dfrac{1}{2} \cdot \dfrac{2}{\sqrt{3}}$ $\quad \tan x = \dfrac{-1}{\sqrt{3}}$ or $\dfrac{-\sqrt{3}}{3}$ $\quad \cot x = -\sqrt{3}$

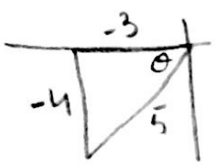
B) 225°

$\sin x = \dfrac{-\sqrt{2}}{2}$ $\quad \csc x = \dfrac{-2}{\sqrt{2}}$ or $-\sqrt{2}$

$\cos x = \dfrac{-\sqrt{2}}{2}$ $\quad \sec x = \dfrac{-2}{\sqrt{2}}$ or $-\sqrt{2}$

$\tan x = 1$ $\quad \cot x = 1$

(15) A) $\cos\theta = -\frac{3}{5}$ QIII



$(-3)^2 + b^2 = 5^2$

$9 + b^2 = 25$

$b = 4$

$\sin\theta = -\frac{4}{5}$ $\quad \csc\theta = -\frac{5}{4}$

$\cos\theta = -\frac{3}{5}$ $\quad \sec\theta = -\frac{5}{3}$

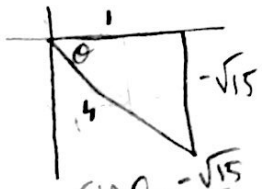
$\tan\theta = \frac{4}{3}$ $\quad \cot\theta = \frac{3}{4}$

B) $\sec\theta = 4$ $\tan\theta < 0$ $\quad 1^2 + b^2 = 4^2$

$\cos\theta = \frac{1}{4}$ QIV $\quad 1 + b^2 = 16$

$b^2 = 15$

$b = -\sqrt{15}$

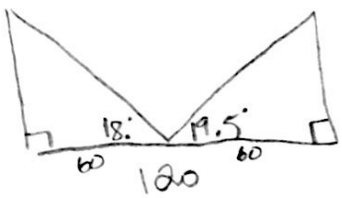


$\sin\theta = -\frac{\sqrt{15}}{4}$ $\quad \csc\theta = -\frac{4}{\sqrt{15}}$ or $\frac{-4\sqrt{15}}{15}$

$\cos\theta = \frac{1}{4}$ $\quad \sec\theta = 4$

$\tan\theta = -\sqrt{15}$ $\quad \cot\theta = -\frac{1}{\sqrt{15}}$ or $-\frac{\sqrt{15}}{15}$

(16)

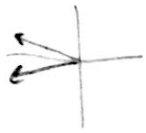


Tree 1: $\tan 18 = \frac{x}{60}$ $\quad$ Tree 2: $\tan 19.5 = \frac{x}{60}$

$19.495 = x$ $\quad x = 21.247$

1.75 feet

(17) A) $\cos\theta = -\frac{\sqrt{3}}{2}$



$\theta = \frac{5\pi}{6}, \frac{7\pi}{6}$

B) $2\sin\theta - 1 = 0$

$\sin\theta = \frac{1}{2}$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}$

C) $3\tan\theta + 3 = 0$

$\tan\theta = -1$

$\theta = \frac{3\pi}{4}, \frac{7\pi}{4}$

D) $\cos 3\theta = \frac{1}{2}$

$U = 3\theta$

$\cos U = \frac{1}{2}$

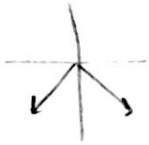
$U = \frac{\pi}{3}$ $\quad U = \frac{5\pi}{3}$

$3\theta = \frac{\pi}{3}$ $\quad 3\theta = \frac{5\pi}{3}$

$\theta = \frac{\pi}{9}$ $\quad \theta = \frac{5\pi}{9}$

E) $2\sin(5\theta + \frac{\pi}{3}) + \sqrt{2} = 0$

$U = 5\theta + \frac{\pi}{3}$



$2\sin U + \sqrt{2} = 0$

$\sin U = -\frac{\sqrt{2}}{2}$

$U = \frac{5\pi}{4}$ $\quad U = \frac{7\pi}{4}$

$5\theta + \frac{\pi}{3} = \frac{5\pi}{4}$ $\quad 5\theta + \frac{\pi}{3} = \frac{7\pi}{4}$

$5\theta = \frac{11\pi}{12}$ $\quad 5\theta = \frac{17\pi}{12}$

$\theta = \frac{11\pi}{60}$ $\quad \theta = \frac{17\pi}{60}$

(18) A) $\sin\theta = -.89$

$\theta = -1.097$

*radian mode

B) $\cos\theta = .23$

$\theta = 1.339$

C) $\tan\theta = -2.15$

$\theta = -1.135$

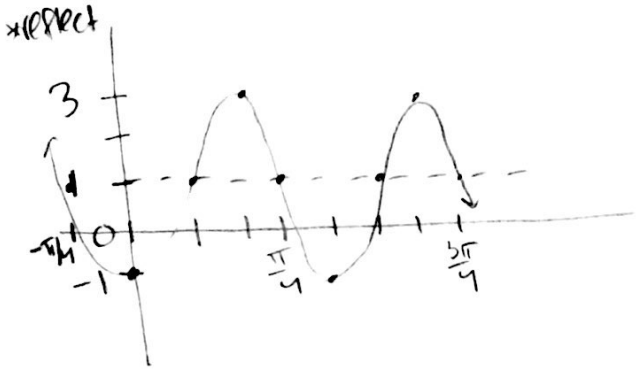
(19) A) $y=-2\sin(4x+\pi)+1$

$y=-2\sin 4(x+\frac{\pi}{4})+1$

transf: reflect x axis, V. stretch by 2, Hor shrink by 1/4, left $\pi/4$, up 1

amp: 2 pd: $\frac{2\pi}{b}=\frac{2\pi}{4}=\frac{\pi}{2}$ D: $(-\infty,\infty)$ R: $[-1,3]$

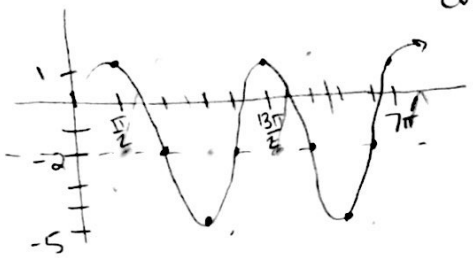
$\frac{-\pi}{4}+\frac{\pi}{2}=\frac{\pi}{4}$



B) $y=3\cos\frac{1}{3}(x-\frac{\pi}{2})-2$ transf: V. stretch by 3, H stretch by 3, right $\frac{\pi}{2}$, down 2

amp: 3 pd: $\frac{2\pi}{b}=\frac{2\pi}{1/3}=6\pi$ D: $(-\infty,\infty)$ R: $[-5,1]$

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



(20) A) Amp: 5

Pd: π $\frac{2\pi}{b}=\pi$

P.S: right $\frac{\pi}{4}$ $2\pi=\pi b$

$2=b$

V.S. none

Funct: $y=5\cos 2(x-\frac{\pi}{4})$

B) Amp: 2 (reflect)

Pd: 6π $\frac{2\pi}{3}=6\pi$

P.S. right $\frac{3\pi}{2}$ $2\pi=6\pi b$

$\frac{2}{6}=b$

V.S. up 3 $1/3=b$

Function: $y=-2\sin\frac{1}{3}(x-\frac{3\pi}{2})+3$

(21) A) $y=5-2\sin(\frac{2x}{3})$

$y=-2\sin\frac{2}{3}(x)+5$

Amp: 2

Pd: $\frac{2\pi}{2/3}=\frac{6\pi}{2}=3\pi$

P.S. none

V.S. up 5

B) $y=3\cos(6x+\pi)$

$y=3\cos 6(x+\frac{\pi}{6})$

Amp: 3

Pd: $\frac{2\pi}{6}=\frac{\pi}{3}$

P.S. left $\pi/6$

V.S. none

(22) A) $y=\frac{1}{2}\sin 6(x)-4$

$\frac{2\pi}{b}=\frac{\pi}{3}$

$6\pi=b\pi$

$6=b$

B) $y=\cos(x-\frac{5\pi}{6})+3$

$\frac{2\pi}{b}=2\pi$

$b=1$

Standard 2.04 - Key

① $f(x) = (x-2)^2 + 3$

$y = (x-2)^2 + 3$

inverse

$x = (y-2)^2 + 3$

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

$(x-3)^{1/2} = y - 2$

$(x-3)^{1/2} + 2 = y$

$\boxed{f^{-1}(x) = (x-3)^{1/2} + 2}$

② $f(x) = \frac{x}{x-3}$ $g(x) = \frac{x+1}{2x}$

$f(g(x)) = f\left(\frac{x+1}{2x}\right) = \frac{\left(\frac{x+1}{2x}\right)}{\left(\frac{x+1}{2x}\right) - 3} = \frac{\frac{x+1}{2x}}{\frac{x+1}{2x} - \frac{6x}{2x}} = \frac{\frac{x+1}{2x}}{\frac{x+1-6x}{2x}} = \frac{x+1}{\cancel{2x}} \cdot \frac{\cancel{2x}}{1-5x}$

$f(g(x)) = \frac{x+1}{1-5x}$ D: $1-5x \neq 0$, $-5x \neq -1$, $x \neq \frac{1}{5}$ $(-\infty, \frac{1}{5}) \cup (\frac{1}{5}, \infty)$

③ $f(x) = 4x + 2$ $g(x) = \sqrt{x-8}$

$f(g(x)) = f(\sqrt{x-8}) = 4(\sqrt{x-8}) + 2$

$-6 = 4\sqrt{x-8} + 2$

$-8 = 4\sqrt{x-8}$

$-2 = \sqrt{x-8}$

$4 = x - 8$

$12 = x$ $f(g(x)) = -6$ when $x = 12$

④ $y = 2^{3x} + 4$

$x = 2^{3y} + 4$

$x - 4 = 2^{3y}$

$\log_2 x - 4 = 3y$

$\frac{\log_2(x-4)}{3} = y$

⑤ $h(x) = \sqrt[3]{x} - 3$

$y = \sqrt[3]{x} - 3$

$x = \sqrt[3]{y} - 3$

$x + 3 = \sqrt[3]{y}$

$(x+3)^3 = y$

⑥ a) $f(x) = 3x - 11$

$y = 3x - 11$

$x = 3y - 11$

$x + 11 = 3y$

$\frac{x+11}{3} = y$

b) $f(x) = 2x^2 + 1$

$y = 2x^2 + 1$

$x = 2y^2 + 1$

$x - 1 = 2y^2$

$\frac{x-1}{2} = y^2$

$\sqrt{\frac{x-1}{2}} = y$

Standard 2.07 Key

① $a_1 = 7$ $a_2 = \sqrt[3]{a_1 + 1}$ $a_3 = \sqrt[3]{a_2 + 1}$ $a_{n+1} = \sqrt[3]{a_n + 1}$

n	1	2	3	4	5
a_n	7	2.9	2.4	2.3	2.3

② converges: • $|r| < 1$
• graph goes to specific #

diverges: • $|r| > 1$
• graph goes to ∞ or alternates

③ $\sum_{n=4}^{8} (3n-2)$

A) $[3(4)-2]+[3(5)-2]+[3(6)-2]+[3(7)-2]+[3(8)-2]$

B) $10+13+16+19+22 = \boxed{80}$

④ $S_n = \frac{n}{2}(a_1 + a_n)$ $n=20$ $a_1 = 151$ $a_{20} = -1$

$a_n = a_1 + d(n-1)$
$a_n = a_m + d(n-m)$
$7 = 63 + d(19-12)$
$-56 = 7d$
$-8 = d$

$a_n = a_1 - 8(n-1)$
$7 = a_1 - 8(19-1)$
$7 = a_1 - 144$
$151 = a_1$

$a_n = 151 - 8(n-1)$
$a_{20} = 151 - 8(20-1)$
$a_{20} = -1$

$S_{20} = \frac{20}{2}(151 + -1) = \boxed{1500}$

⑤ $S_\infty = \frac{a_1}{1-r}$

$2.5 = \frac{2}{1-r}$

$2.5(1-r) = 2$

$1 - r = .8$

$-r = -.2$

$\boxed{r = 0.2}$

⑥ a)
$a_1 = 25$
$a_2 = 27$
$a_3 = 29$
$a_{15} = ?$
$d = 2$

$a_n = a_1 + d(n-1)$
$a_n = 25 + 2(n-1)$
$a_n = 25 + 2n - 2$
$\boxed{a_n = 2n + 23}$

b) $S_n = \frac{n}{2}(a_1 + a_n)$

$a_{15} = 2(15) + 23 = 53$

$S_{15} = \frac{15}{2}(25 + 53)$

$\boxed{S_{15} = 585}$

c) $585(\$12)$

$\boxed{\$7020}$

⑦ $a_1 = 7$ $a_n = 5 \cdot a_{n-1}$

$a_2 = 35$
$a_3 = 175$
$a_4 = 875$
$a_5 = 4375$
$a_6 = 21875$

$a_n = a_1 \cdot r^{n-1}$
$a_n = 7 \cdot 5^{n-1}$

⑧ A) $4+7+10+13+\ldots+[3(33)+1]$

$\sum_{n=1}^{33} 3n+1$

$a_n = a_1 + d(n-1)$
$a_n = 4 + 3(n-1)$
$4 + 3n - 3$
$a_n = 3n + 1$

B) $1 + \frac{2}{7} + \frac{4}{49} + \frac{8}{343} + \ldots + \frac{128}{823543}$

$r = \frac{2}{7}$

$a_n = a_1 \cdot r^{n-1}$

$\frac{128}{823543} = 1 \cdot \frac{2}{7}^{n-1}$

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

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

(9) $a_1 = 40$
$a_2 = 38$
$a_3 = 36$
$\vdots$
$a_n = 12$

$d = -2$

$a_n = a_1 + d(n-1)$

$12 = 40 - 2(n-1)$

$-28 = -2n + 2$

$-30 = -2n$

$15 = n$

$S_n = \frac{n}{2}(a_1 + a_n)$

$S_n = \frac{15}{2}(40 + 12)$

$\boxed{S_n = 390 \text{ seats}}$

(10) $a_1 = 7$
$a_2 = 15$
$a_3 = 23$
$\vdots$
$a_{35} = ?$

$a_n = a_1 + d(n-1)$

$a_{35} = 7 + 8(35-1)$

$\boxed{a_{35} = 279}$

$S_{35} = \frac{n}{2}(a_1 + a_n)$

$S_{35} = \frac{35}{2}(7 + 279)$

$\boxed{S_{35} = 5005 \text{ problems}}$

(11) $a_1 = 35000$
$r = 1.03$
$a_7 = ?$

$a_7 = a_1 \cdot r^{n-1}$

$a_7 = 35000(1.03)^{(7-1)}$

$\boxed{a_7 = \$41791.83}$

(12) A) $\frac{4}{3}, 1, \frac{3}{4}, \frac{9}{16}$

geometric

exp. $a_n = \frac{4}{3}\left(\frac{3}{4}\right)^{(n-1)}$

rec. $a_n = a_{n-1} \cdot \frac{3}{4}$; $a_1 = \frac{4}{3}$

$a_5 = \left(\frac{4}{3}\right)\left(\frac{3}{4}\right)^{(5-1)} = .42$

$S_5 = \left(\frac{4}{3}\right)\left(\frac{1 - \frac{3}{4}^5}{1 - \frac{3}{4}}\right) = 4.07$

B) $6.5, 4.4, 2.3, 0.2, \ldots$

arithmetic

exp: $a_n = 6.5 - 2.1(n-1)$

$a_n = 6.5 - 2.1n + 2.1$

$a_n = -2.1n + 8.6$

rec $a_n = a_{n-1} - 2.1$; $a_1 = 6.5$

$a_5 = -2.1(5) + 8.6 = -1.9$

$S_5 = \frac{5}{2}(6.5 + -1.9) = 11.5$

(13) $a_{10} = -121$ $a_{32} = -319$

$a_n = a_m + d(n-m)$

$-319 = -121 + d(32-10)$

$-198 = 22d$

$d = -9$

$a_n = a_1 + d(n-1)$

$-319 = a_1 - 9(32-1)$

$-319 = a_1 - 279$

$-40 = a_1$

$a_n = -40 - 9(n-1)$

$a_n = -40 - 9n + 9$

exp. $\boxed{a_n = -9n - 31}$

rec. $\boxed{a_n = a_{n-1} - 9 \text{ ; } a_1 = -40}$

(14) A) $a_n = 3 + a_{n-1}$

$a_1 = 3$ $a_2 = 6$ $a_3 = 9$ $a_4 = 12$ $a_5 = 15$

B) $a_n = 1 - n + a_{n-1} + a_{n-2}$

$a_1 = -2$ $a_2 = 7$ $a_3 = 3$ $a_4 = 7$

$a_5 = 6$

Standard 2.08 - Key

① $f(x) = \frac{x+1}{(x-2)(x+3)}$

$f(x) \to -\infty$ and $f(x) \to \infty$

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

$= \frac{1}{Big} \cdot Big$

$= 0 \cdot Big$

$f(x) \to 0$

③ $f(x) = \sin(\frac{\pi}{x})$ as $x \to 0$

$\lim_{x \to 0^+} \sin(\frac{\pi}{x})$

try $x = 1$ $\sin(\frac{\pi}{1}) = \sin(\pi) = 0$

$\lim_{x \to 0^-} \sin(\frac{\pi}{x})$ $\sin(\frac{\pi}{-1}) = \sin(-\pi) = 0$

try $x = -1$

$f(x) \to 0$

④ A) $\lim_{x \to 2} \frac{2x^2 - 4x}{x^2 - 4} = \frac{2x(x-2)}{(x+2)(x-2)} = \frac{2x}{x+2} \to \frac{2(2)}{2+2} = \frac{4}{4} = 1$

B) $\lim_{x \to 5} \frac{\frac{1}{x} - \frac{1}{5}}{x-5}$

$\lim_{x=5^+}$ try 6 $\frac{\frac{1}{6} - \frac{1}{5}}{6-5} = \frac{-1/30}{1} = -1/30 = -.03$

$\lim_{x \to 5^-}$ try 4 $\frac{\frac{1}{4} - \frac{1}{5}}{4-5} = \frac{\frac{1}{20}}{-1} = -1/20 = -.05$

$f(x) \to -.04$

c) $\lim_{x \to \infty} \frac{4n^2 - 5n}{3n^2 + 4}$ = explain same $= \frac{4}{3}$