

121

TEST 1 FALL 2016

KEY

①

$$2x - 11 = 5x + 12$$

~~5~~

$$2x = 5x + 23$$

$$-3x = 23$$

$$x = \frac{23}{-3}$$

10 pts

②

$$\frac{3}{4}x - \frac{1}{5} = \frac{5}{6}$$

$$\text{LCD} = 2 \cdot 2 \cdot 5 \cdot 3$$

$$\left(\frac{3x}{4}\right)\left(\frac{15}{15}\right) - \left(\frac{1}{5}\right)\left(\frac{12}{12}\right) = \left(\frac{5}{6}\right)\left(\frac{10}{10}\right)$$

$$\frac{45x - 12}{\text{LCD}} = \frac{50}{\text{LCD}}$$

$$45x - 12 = 50$$

$$45x = 62$$

$$x = \frac{62}{45}$$

5 pts

121 TEST 1

(3) $3x^2 = -7$

$$x^2 = -\frac{7}{3}$$

$$x = \pm \sqrt{-\frac{7}{3}} = \pm i \sqrt{\frac{7}{3}} = \pm i \frac{\sqrt{7}}{\sqrt{3}}$$

$$= \pm i \left(\frac{\sqrt{7}}{\sqrt{3}} \right) \left(\frac{\sqrt{3}}{\sqrt{3}} \right)$$

$$= \pm i \frac{\sqrt{21}}{3} = x$$

SPK

(4)

$$4x^2 + 4x - 2 = 0$$

$$a=4, b=4, c=-2$$

$$b^2 - 4ac = 4^2 - 4(4)(-2)$$

$$= 16 + 32 = 48$$

$$\sqrt{48} = 4\sqrt{3}$$

$$\begin{array}{r} 2 \overline{)48} \\ \underline{2} \\ 2 \\ \underline{2} \\ 2 \\ \underline{2} \\ 0 \end{array}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-4 \pm 4\sqrt{3}}{2(4)} = \frac{4(-1 \pm \sqrt{3})}{8}$$

$$= \frac{-1 \pm \sqrt{3}}{2} = x$$

SPK

1.366025404
-0.366025404

$$(5) \quad 9x^2 - 30x + 32 = 0$$

$$a=9, b=-30, c=32$$

$$b^2 - 4ac = (-30)^2 - 4(9)(32)$$

$$= 900 - 1152 = -252$$

5 pts

$$\begin{array}{r} 32 \\ 36 \\ \hline 192 \\ 960 \\ \hline 1152 \end{array}$$

Two distinct nonreal zeros
↓
solutions

$$(6) \quad 49x^2 + 154x + 121 = 0$$

$$a=49, b=154, c=121$$

$$b^2 - 4ac = (154)^2 - 4(49)(121)$$

$$= 23716 - 23716 = 0$$

5 pts

One distinct real (and rational!)
solution (Repeated root.)

$$(7) \quad 10x^2 + x - 21 = 0$$

$$a=10, b=1, c=-21$$

$$b^2 - 4ac = 1^2 - 4(10)(-21)$$

$$= 1 + 840 = 841 = 29^2$$

$$\begin{array}{r} 21 \\ 40 \\ \hline 840 \end{array}$$

5 pts

Two distinct real (RATIONAL!) solutions

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TEST 1

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$$x^2 - 9x + 18 = 0$$

$$(x-6)(x-3) = 0$$

$$x \in \{3, 6\}$$

Digit Answer

10 pts

9

$$10x^2 + 15x - 14 = 0$$

-210

$$+49 + 50 = 1$$

$$+20 + 19 = 1$$

$$+15 - 14 = 1$$

$$(15)(-14) = -210$$

$$\begin{array}{r} 15 \\ 14 \\ \hline 30 \\ 15 \\ \hline 210 \end{array}$$

5 pts

$$10x^2 + 15x - 14x - 21 = 0$$

$$5x(2x+3) - 7(2x+3) = 0$$

$$(2x+3)(5x-7) = 0$$

$$x = -\frac{3}{2}$$

$$x = \frac{7}{5}$$

$$x \in \left\{ -\frac{3}{2}, \frac{7}{5} \right\}$$

~~$10(x^2 + \frac{15}{10}x + (\frac{3}{4})^2) = 21 + \frac{9}{4}$
 $10(x^2 + \frac{3}{2}x + \frac{9}{4}) = 21 + \frac{9}{4}$
 $10(x + \frac{3}{4})^2 = \frac{84}{4} + \frac{9}{4} = \frac{93}{4}$
 $(x + \frac{3}{4})^2 = \frac{93}{40}$
 $x + \frac{3}{4} = \pm \sqrt{\frac{93}{40}}$
 $x = -\frac{3}{4} \pm \sqrt{\frac{93}{40}}$~~

$$x^2 + \frac{1}{10}x + \left(\frac{1}{20}\right)^2 = \frac{21}{10} + \left(\frac{1}{20}\right)^2$$

$$\left(x + \frac{1}{20}\right)^2 = \frac{21}{10} + \frac{1}{400} = \frac{840}{400} + \frac{1}{400} = \frac{841}{400}$$

$$x + \frac{1}{20} = \pm \sqrt{\frac{841}{400}} = \pm \frac{29}{20}$$

$$x = -\frac{1}{20} \pm \frac{29}{20}$$

121 TEST 1

10

$$x^2 + 10x - 11 = 0$$

$$x^2 + 10x = 11$$

$$x^2 + 10x + 5^2 = 11 + 25$$

$$(x+5)^2 = 36$$

$$x+5 = \pm \sqrt{36} = \pm 6$$

$$x = -5 \pm 6 \rightarrow \begin{cases} x = 1 \\ x = -11 \end{cases}$$

$$x \in \{-11, 1\}$$

S.P.K

11

$$2x^2 - 3x - 7 = 0$$

$$2x^2 - 3x = 7$$

$$2(x^2 - \frac{3}{2}x) = 7$$

$$2(x^2 - \frac{3}{2}x + (\frac{3}{4})^2) = 7 + 2(\frac{9}{16})$$

$$2(x - \frac{3}{4})^2 = \frac{56}{8} + \frac{9}{8} = \frac{65}{8}$$

$$(x - \frac{3}{4})^2 = \frac{65}{16}$$

$$x - \frac{3}{4} = \pm \frac{\sqrt{65}}{4}$$

$$x = \frac{3 \pm \sqrt{65}}{4}$$

S.P.K

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TEST 1

(12) (a) thru $(-2, 3)$, $m = -2$

$$y = m(x - x_1) + y_1 \quad (\text{parallel to } m = -2)$$

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

$$y = -2x - 1$$

5P/3

(b) $m = +\frac{1}{2}$ (perpendicular to $m = -2$)

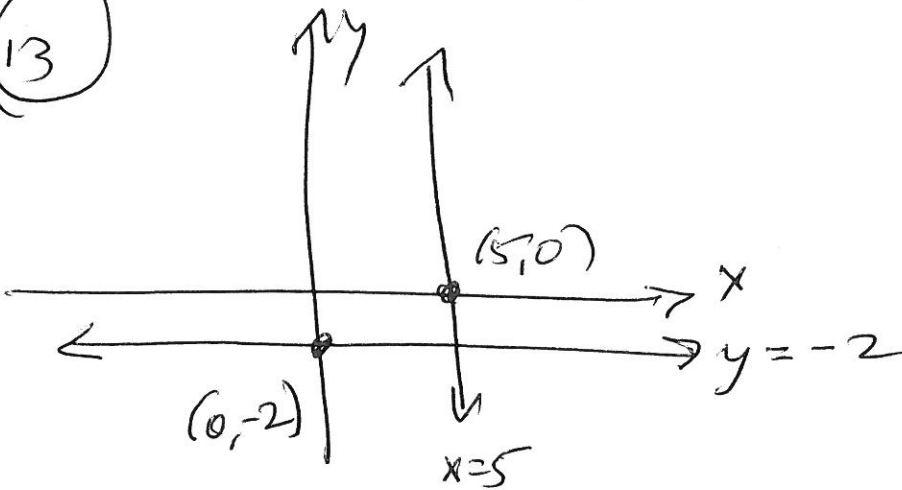
$$y = \frac{1}{2}(x + 2) + 3$$

$$y = \frac{1}{2}x + 4$$

$$= \frac{1}{2}x + 4$$

5P/3

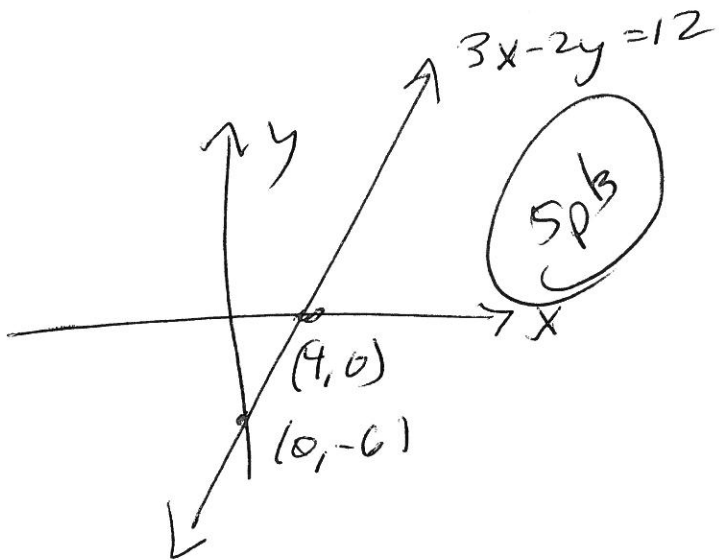
(13)



5P/3 eq

(14) $3x - 2y = 12$

x	y
0	-6
4	0



5P/3

(15) (a) $|3-2x| > 7$

10pts

$3-2x > 7$ OR $3-2x < -7$

$-2x > 4$ OR $-2x < -10$

Divide by -2 :

$x < \frac{4}{-2} = -2$ OR $x > \frac{-10}{-2} = 5$



OR

$x \in (-\infty, -2) \cup (5, \infty)$

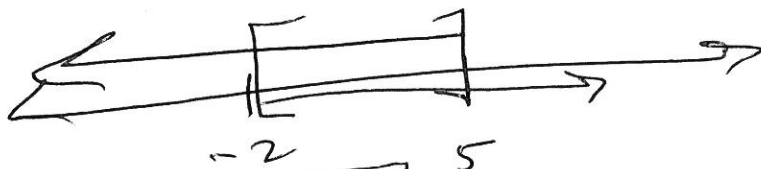
(b) $|3-2x| \leq 7$

5pts

$3-2x \leq 7$ AND $3-2x \geq -7$

$-2x \leq 4$ AND $-2x \geq -10$

$x \geq -\frac{4}{2} = -2$ AND $x \leq \frac{-10}{-2} = 5$



AND

$x \in [-2, 5]$

$|3-2x| + 9 < 7$

$|3-2x| < 7-9$

(c) $|3-2x| + 9 > 7$
 $(-\infty, \infty)$ (5pts)

(d)

\emptyset (5pts)

(16) $x = \text{Amt of } 35\% \text{ Alcohol soln (ingals)}$

Then $.35x + .70(20) = .5(x+20)$ (5pts)

(17) Let $x = \text{amt of time Bill works (hrs)}$

Then $\frac{1}{6}x + \frac{1}{8}x = 1$ job done (5pts)

$8x + 6x = 48$
 $14x = 48$
 $x = \frac{48}{7}$

(18) Let $x = \text{amt of time Bill works (hrs)}$

Then $\frac{1}{6}(x) + \frac{1}{8}(x+1) = 1$

LCD = 2, 3, 2, 2
 = 24

$$\left(\frac{x}{6}\right)\left(\frac{4}{4}\right) + \left(\frac{x+1}{8}\right)\left(\frac{3}{3}\right) = \left(\frac{1}{1}\right)\left(\frac{24}{24}\right)$$

$$\frac{4x + 3(x+1)}{\text{LCD}} = \frac{24}{\text{LCD}}$$

$$4x + 3x + 3 = 24$$

$$7x = 21$$

$$x = 3 \text{ hrs for Bill}$$

$$x+1 = 4 \text{ hrs for Tom}$$

(5pts)

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Test 1

19

$$f(x) = x^2 - 8x - 5$$

$$= x^2 - 8x + 4^2 - 16 - 5$$

$$= (x-4)^2 - 21$$

$$(h, k) = (4, -21)$$

5 p3