Review

1) $50x - 25 = 2x^3 - x^2$

$2x^3 - x^2 - 50x + 25$

$x^2(2x-1) - 25(2x-1)$

$(2x-1)(x^2-25)$

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

$x = \{-5, \frac{1}{2}, 5\}$

3) 21000, 4%, 9%

INT +1290

4% 9%

$x + y = 21000$

$0.04x + 0.09y = 1290$

$x = 21000 - y$

$100(0.04x + 0.09y) = 1290(100)$

$4x + 9y = 129000$

$4(21000 - y) + 9y = 129000$

$84000 - 4y + 9y = 129000$

$5y = 45000$

$y = 9000$

$x = 21000 - y$

$x = 21000 - 9000$

$x = 12000$

12000 at 4%

9000 at 9%

5) $10x - 12 \leq 2x - 15$

$8x \leq -3$

$x \leq -\frac{3}{8}$ $(-\infty, -\frac{3}{8}]$

7) $(2+9i)^2 = (2+9i)(2+9i)$

$= 4 - 81 = -77$

9) $\frac{x}{x+7}$ $x + 7 \neq 0$

$x \neq -7$

$x \neq -7$

2) $\frac{5i}{7-9i} \cdot \frac{(7+9i)}{(7+9i)}$

$\frac{35i - 45}{49 - 81} = \frac{-45 + 35i}{-32}$

4) $(x-5)^{2/3} = 81$

$[(x-5)^{2/3}]^{3/2} = 81^{3/2}$

$x - 5 = 729$

$x = 734$

$(734-5)^{2/3} = 81$

$81 = 81$ ✓

6) $x \neq 0$

$\frac{2}{x} + 3 = \frac{4}{3x} + \frac{28}{9}$

SINCE $x \neq 0$ WE CAN DO THIS ↓

$\left(\frac{9}{9}\right)\left(\frac{2}{x}\right) + \left(\frac{9x}{9x}\right)\left(\frac{3}{1}\right) = \frac{4}{3x}\left(\frac{3}{3}\right) + \frac{28}{9}\left(\frac{x}{x}\right)$

$\frac{18}{9x} + \frac{27x}{9x} = \frac{12}{9x} + \frac{28x}{9x}$

SINCE DENOMINATORS ARE EQUAL WE SOLVE

$18 + 27x = 12 + 28x$

$6 = x$

8) $(4x+3)(x+2) = 3$

$4x^2 + 8x + 3x + 6 = 3$

$4x^2 + 11x + 3 = 0$

$b^2 - 4ac = 121 - 4(4)(3)$

$= 121 - 48$

$= 73$

USE QUADRATIC

$x = \frac{-11 \pm \sqrt{73}}{2(4)} = \frac{-11 \pm \sqrt{73}}{8}$

$= \frac{-11 \pm \sqrt{73}}{8}$

10) $\frac{3x}{x+3} = 8 - \frac{9}{x+3}$

a) $x \neq -3$

$\frac{3x}{x+3} = \frac{(x+3)8}{x+3} - \frac{9}{x+3}$

$3x = 8x + 24 - 9$

$3x = 8x - 15$

$15 = 5x$

b) $x = 3$

11) $4i - (16 - 6i)$

$4i - 16 + 6i$

$10i - 16$

12) $5(x+8)^2 = 60$

$(x+8)^2 = 12$

$x + 8 = \pm\sqrt{12}$

$x + 8 = \pm 2\sqrt{3}$

$x = -8 \pm 2\sqrt{3}$

Check answers

$x + 8 = -8 + 2\sqrt{3} + 8$ $\quad -8 - 2\sqrt{3} + 8$

$= 2\sqrt{3}$ $\quad -2\sqrt{3}$

$5(2\sqrt{3})^2 \stackrel{?}{=} 60$ $\quad 5(-2\sqrt{3})^2 \stackrel{?}{=} 60$

$5(12) = 60$ $\quad 5(12) = 60$

$60 = 60$ ✓ $\quad 60 = 60$ ✓

$x \{-8 \pm 2\sqrt{3}\}$

13) $x^2 - 18x - 2 = 0$

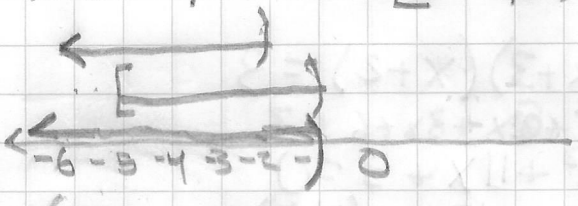
$x^2 - 18x + (-9)^2 = 2 + (-9)^2$

$(x-9)^2 = 83$

$x - 9 = \pm\sqrt{83}$

$x = 9 \pm \sqrt{83}$

14) $(-\infty, -2) \cup [-5, 1)$



$(-\infty, -1)$

15) $y_1 = \frac{x-4}{5}$ $\quad y_2 = \frac{x-11}{6}$

$y_1 - y_2 = 1$

$\frac{x-4}{5} - \frac{x-11}{6} = 1$

multiply by 30 (5·6)

$6(x-4) - 5(x-11) = 30$

$6x - 24 - 5x + 55 = 30$

$x + 31 = 30$

$x = -1$

Check this

$\frac{-1-4}{5} - \frac{-1-11}{6} \stackrel{?}{=} 1$

$\frac{-5}{5} - \frac{-12}{6} \stackrel{?}{=} 1$

$-1 + 2 \stackrel{?}{=} 1$ ✓

16) $x^2 - 6x - 6 = 0$

$b^2 - 4ac = 0$

$(-6)^2 - 4(1)(-6)$

$36 + 24 = 60$

2 Real solutions

17) $|2x - 4| > 10$

$2x - 4 < -10$ $\quad 2x - 4 > 10$

$2x < -6$ $\quad 2x > 14$

$x < -3$ $\quad x > 7$

18) $3\left|7-\frac{7}{4}x\right|+11=32$

$3\left|7-\frac{7}{4}x\right|=21$

$\left|7-\frac{7}{4}x\right|=7$

$7-\frac{7}{4}x=7$ $\quad$ $7-\frac{7}{4}x=-7$

$-\frac{7}{4}x=0$ $\quad$ $-\frac{7}{4}x=-14$

$x=0$ $\quad$ $-7x=-56$

$x=8$

Check

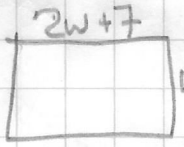
$3\left|7-\frac{7}{4}(0)\right|+11=32$ $\quad$ $3\left|7-\frac{7}{4}(8)\right|+11=32$

$3|7|+11=32$ $\quad$ $3|7-14|+11=32$

$21+11=32$ ✓ $\quad$ $3|-7|+11=32$

$21+11=32$ ✓

20)



$P=350$

$2l+2w=350$

$2(2w+7)+2(w)=350$

$4w+14+2w=350$

$6w+14=350$

$6w=336$

$w=56$

119×56

22) $x-\sqrt{3x-11}=7$

$x-7=\sqrt{3x-11}$

$x^2-14x+49=3x-11$

$x^2-17x+60=0$

$(x-5)(x-12)=0$

$x=5, x=12$

Check extraneous

$5-\sqrt{3(5)-11}\stackrel{?}{=}7$ $\quad$ $12-\sqrt{3(12)-11}\stackrel{?}{=}7$

$5-\sqrt{15-11}\stackrel{?}{=}7$ $\quad$ $12-\sqrt{25}\stackrel{?}{=}7$

$5-2=7$ $\quad$ $12-5\stackrel{?}{=}7$

$7=7$ ✓

19) bachelors $=x$

masters $=2x-50000=y$

$x+y=124000$

$x+2x-50000=124000$

$3x=174000$

$x=58000$

$y=66000$

$58000 & $66000

21) $36x^4=85x^2-49$

$36x^4-85x^2-49=0$

$a=x^2$

$36a^2-85a+49=0$

$b^2-4ac=(-85)^2-4(36)(49)$

$=7225-7056$

$=169=13^2$

$a=\frac{85\pm 13}{2(36)}=\frac{72}{72}, \frac{49}{36}$

$a=1, \frac{49}{36}$

$x^2=1$ $\quad$ $x^2=\frac{49}{36}$

$x=\pm 1$ $\quad$ $x=\pm\frac{7}{6}$

$x=\{-1, -\frac{7}{6}, \frac{7}{6}, 1\}$

23) $5x-(3x-3)=9$

$5x-3x+3=9$

$2x=6$

$x=3$

24) $A=W+nm$ Solve for n

$A-W=nm$

$\frac{A-W}{m}=n$

25) $\frac{x^2+12x+36}{x^3+216} \cdot \frac{2}{x+6}$

$\frac{(x+6)(x+6)}{(x+6)(x^2-6x+36)} \cdot \frac{2}{(x+6)}$

$\frac{2}{x^2-6x+36}$; $x \neq 6, -6$

27) $-1 \leq \frac{2}{3}x+3 < 5$

$-4 \leq \frac{2}{3}x \leq 2$

$-12 \leq 2x \leq 6$

$-6 \leq x \leq 3$

$[-6, 3]$

29) $\left| \frac{3x+6}{3} \right| < 3$

$-3 < \frac{3x+6}{3} < 3$

$-9 < 3x+6 < 9$

$-15 < 3x < 3$

$-5 < x < 1$

$(-5, 1)$

31) $\frac{x-5}{x^2+5x+4} = \frac{x-5}{(x+1)(x+4)}$

$x \neq \{-4, -1\}$

33) $\$170 = x - 0.75x$

$= 0.25x$

$\$680 = x$

26) $2x^2-15x-1=0$

$b^2-4ac = (-15)^2-4(2)(-1)$

$= 225+8 = 233$

$x = \frac{15 \pm \sqrt{233}}{4}$

28) $9x^2+21x-8=0$

$9x^2+24x-3x-8=0$

$3x(3x+8)-1(3x+8)=0$

$(3x-1)(3x+8)=0$

$3x-1=0$ $\quad$ $3x+8=0$

$3x=1$ $\quad$ $3x=-8$

$x=1/3$ $\quad$ $x=-8/3$

$x = \{-\frac{8}{3}, \frac{1}{3}\}$

30) $(-8-\sqrt{5})^2 = (-8-i\sqrt{5})^2$

$64+16\sqrt{5}i+5$

$69+16\sqrt{5}i$

32) $\frac{x^2-2x+1}{4x-4} = \frac{(x-1)^2}{4(x-1)}$

$= \frac{x-1}{4}$; $x \neq 1$

34) $(4-7i)(5-3i)$

$20-47i-21$

$-1-47i$