(2) $\sqrt{x^2+3x-10}+x+5=\sqrt{x+5}$

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

divide thro' by $\sqrt{x+5}$ $\therefore x=-5$

$\therefore \sqrt{x-2}+\sqrt{x+5}=1$

whence $x=11$

which satisfies the equation when the negative root of $x^2+3x-10$ is taken.

(3) $xz+yz=xy$

$x^2(5z+y)=5yz$

$10z-6x^2=10x^2z$

$$\therefore \frac{1}{x}+\frac{1}{y}=\frac{1}{z} \qquad (a)$$

$$\frac{5}{y}+\frac{1}{z}=\frac{5}{x^2} \qquad (b)$$

$$\frac{10}{x^2}-\frac{6}{z}=10 \qquad (c)$$

multiply (a) by 5 and subtract from (b)

$$\therefore \frac{6}{z}=\frac{5}{x}+\frac{5}{x^2}$$

$$\text{but } \frac{6}{z}=\frac{10}{x^2}-10 \text{ from } (c)$$

$$\therefore \frac{5}{x^2}=\frac{5}{x}+10$$

$$\therefore x=\frac{1}{2} \text{ or } -1.$$

If $x=\frac{1}{2}$, $\therefore y=\frac{1}{3}$ and $z=\frac{1}{5}$, &c.

7. $x^4-10x^2+1=0$

$\therefore x^2=5\pm\sqrt{24}=5\pm 2\sqrt{6}$

$\therefore x=\sqrt{5\pm 2\sqrt{6}}=\sqrt{3}\pm\sqrt{2}$

$\therefore \frac{1}{x}=\sqrt{3}\mp\sqrt{2}$

$=1\cdot7320\mp1\cdot4142$

$=.317$ or 2.146.

8. Let d be the com. dif. and p the number of terms.

$$\therefore \frac{m}{n}+md=(m+1)\text{th term}=1$$

$$\therefore d=\frac{n-m}{mn}$$

$$\text{and } \frac{m}{n}+(p-1)d=\text{last term}=\frac{n}{m}$$

$$\therefore p=m+n+1$$

$$\text{and sum of series}=\left(\frac{m}{n}+\frac{n}{m}\right)\times\tfrac{1}{2}p$$

$$=\frac{m^2+n^2}{mn}\cdot\frac{m+n+1}{2}$$

9. $$\text{Series}=\sqrt{3}\left(1+\frac{1}{\sqrt{2}}+\frac{1}{2}+\&c.\right)$$

$$\therefore s=\sqrt{3}(2+\sqrt{2})(1-2^{-n})$$

and sum to infinity $=\sqrt{3}(2+\sqrt{2})$

UNIVERSITY OF TORONTO.—SENIOR MATRICULATION, SEPTEMBER, 1880.

ARITHMETIC AND ALGEBRA.

1. Prove the following :—

(a) When the three right-hand digits of a number are divisible by 8, the whole number is divisible by 8.

(b) When, in a number, the sum of the digits standing in the even places is equal to the sum of those standing in the odd places, the number is divisible by 11.

2. Change 592835 from the decimal to the duodenary scale, shewing clearly the reasons for each step.

3. Prove the rule for reducing a mixed circulating decimal to a vulgar fraction.

Add together :

$7.4\dot{2}\dot{7}$, $9.\dot{1}23\dot{4}$, $17.2987\dot{6}4\dot{3}$, $18.\dot{6}\dot{7}$,

and give your answer in a decimal form.

4. Extract the square root of 79,792,266, 297,612.001 ; and the cube root of 62,712, 728,317.

5. State the ordinary "Index Laws," and deduce the value of a^0.

6. Divide, according to Horner's Method, $x^9+x^8+x^7+2x^6-x^4-x^2-2x-1$ by x^4+x^3+x+1.

7. When $f(x)$ is divided by $x-a$, shew that remainder is $f(a)$.

Ex. $a^3(b-c)+b^3(c-a)+c^3(a-b)$ is exactly divisible by $a+b+c$.