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Test

21.10.24

Name: Maanya

Start time: 9:05

Total time: 75 mins

End time: 10:16

$$1) a) u_n = 8 + (n-1)18 = 18n - 10 \quad A1$$

$$b) S_n = \sum_{k=1}^n (18k - 10) \quad A1$$

$$c) S_{15} = \frac{15}{2} (2 \cdot 8 + (15-1)18) = 2010 \quad M1$$

A1

4/4

$$2) u_n = u_1 r^{n-1}$$

$$500 = 2 \cdot 1.05^{n-1} \quad M1$$

$$n = 114.1675 \dots \quad M1A1 \text{ [Using G.D.C.]}$$

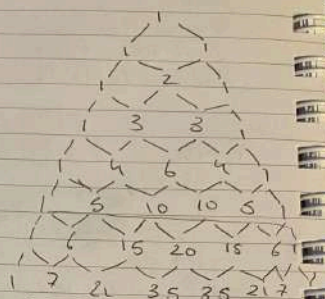
$$u_{115} = 2 \cdot 1.05^{114}$$

$$= 520.7269916$$

$$\approx 521 \quad A1$$

4/5

$$3. (1-2x)^5$$



$$(1-2x)^5 = (1+(-2x))^5 = 1^5 + 5 \cdot 1^4 \cdot (-2x)^1 + 10 \cdot 1^3 \cdot (-2x)^2 + 10 \cdot 1^2 \cdot (-2x)^3 + 5 \cdot 1 \cdot (-2x)^4 + (-2x)^5$$

$$= 1 - 10x + 40x^2 \quad M1$$

first 3 terms

$$(1+x)^7 = 1^7 + 7 \cdot 1^6 \cdot x^1 + 21 \cdot 1^5 \cdot x^2$$

$$= 1 + 7x + 21x^2 \quad M1$$

first 3 terms

$$(1 - 10x + 40x^2)(1 + 7x + 21x^2)$$

$$1 + 7x + 21x^2 - 10x - 70x^2 - 210x^3 + 40x^2 + 280x^3 + 840x^4$$

Ans:  $1 - 3x - 9x^2$  ... first 3 terms

A1A1A1

5/5

4. N/A Haven't done complex numbers

5.  $f(x) - g(x) \leq 0$

$$\frac{x+4}{x+1} - \frac{x-2}{x-4} \quad \text{M1} \quad (x+4)(x-4)$$

$$x^2 - 16 - (x^2 - x - 2) = x^2 - 16 - x^2 + x + 2 = x - 14$$

$$\frac{x-14}{(x+1)(x-4)} \quad \text{A1} \quad \begin{aligned} 2 - 14 \\ = -12 \\ \div -2 \\ = 6 \end{aligned}$$

$$\begin{aligned} & \text{Number line diagram showing intervals } x < -1 \text{ or } 4 < x \leq 14 \end{aligned}$$

$x < -1$  or  $4 < x \leq 14$  A1A1 5/6

6.  $\left(1 + \frac{x}{2}\right)^n$

a)  ${}^nC_3 = 70$  M1A1

$$70 = \frac{n!}{3!(n-3)!} \quad \text{A1} \quad \left(\frac{n}{2}\right)^3 = \frac{n^3}{8}$$

$$\left(\frac{n}{3}\right) = 560 \quad \left(\frac{n}{3}\right) \cdot \frac{1}{8} = 70$$

$$\frac{n(n-1)(n-2)}{6} = 560 \quad \text{M1}$$

$$n(n-1)(n-2) = 3360$$

Ans:  $n = 16$  A1 (Using G.O.C)

b)  $\left(\frac{16}{2}\right) \cdot \left(\frac{x^2}{4}\right)$

$$\frac{16 \cdot 15}{2} = 120$$

$$120 \cdot \frac{x^2}{4} = 30x^2$$

Ans: 30 A1 coefficient

6/6

7.  $PV: 5000 \quad r = 6.3 \quad k = 1$

a)  $FV = 5000 \times \left(1 + \frac{6.3}{100}\right)^n$  A1

b)  $5000 \times \left(1 + \frac{6.3}{100}\right)^5$

$FV = 6786.351134$  A1  
 $\approx \underline{6786}$  A1

c)  $\left(\frac{a}{1}\right) 5000 \times \left(1 + \frac{6.3}{100}\right)^n > 10000$  A1

$\left(\frac{aa}{u}\right) 5000 \times \left(1 + \frac{6.3}{100}\right)^n = 10000$  M1

$n = 11.34538102$  (using 40C) A1

so  $n = \underline{12}$  A1

6/6

8.  $f(2) = f(-1)$  M1M1

$8 + 12 + 2a + b = -1 + 3 - a + b$  A1A1

$20 + 2a + b = 2 - a + b$

$3a = -18$  A1

$a = \underline{-6}$  A1

9. N/A

6/6

10. N/A