

Questions from Homework

$$\begin{aligned} \textcircled{1} \quad a &= 80000 & t_n &= ar^{n-1} \\ t_5 &= 117128 & 117128 &= \frac{80000r^4}{80000} \\ n &= 5 & (1.4641)^{1/4} &= (r^4)^{1/4} \\ r &=? & \boxed{1.1} &= r \end{aligned}$$

$1.1 - 1 = 0.1$
 $0.1 \times 100 = 10\%$

The annual rate of increase is 10% .

$$\begin{aligned} \textcircled{5} \quad a) \quad \sum_{n=1}^5 n^2 + 1 & \\ &= 2 + 5 + 10 + 17 + 26 \\ &= \boxed{60} \end{aligned}$$

$$b) \quad \sum_{n=1}^{\infty} (3) \left(\frac{1}{2}\right)^{n-1}$$

$$\begin{aligned} S_n &= \frac{a}{1-r} \\ &= \frac{3}{1-\frac{1}{2}} \\ &= 3 \div \frac{1}{2} \\ &= \boxed{6} \end{aligned}$$

Functions Toolkit 1

1. Factor Completely

a) $x^4 - 28x^2 + 36$ $\sqrt{36} = 6 \times 2 = 12$

$$(x^4 - 12x^2 + 36) - 16x^2$$

$$(\underline{x^2 - 6})^2 - \underline{16x^2}$$

$$(x^2 - 6 + 4x)(x^2 - 6 - 4x)$$

b) $9x^4 + 38x^2 + 49$ $\sqrt{441} = 21 \times 2 = 42$

$$(9x^4 + 42x^2 + 49) - 4x^2$$

$$(\underline{3x^2 + 7})^2 - \underline{4x^2}$$

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

when $x=2 \rightarrow (x-2)$ is a factor

2. For the following: $y = x^3 - x^2 - 14x + 24$
 $0 = 8 - 4 - 28 + 24$

a) Use the Factor Theorem to factor the function.

find a value of "x" that makes $y=0$

b) State the Roots of the function

c) Find the y intercept

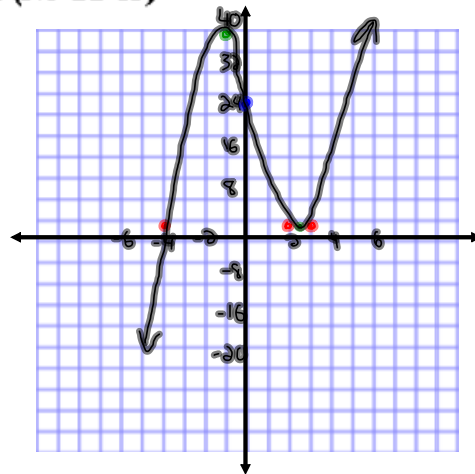
d) State the approximate Local Maximum (No TI-83)

e) State the approximate Local Minimum (No TI-83)

f) Sketch the function

$$\begin{array}{r}
 \text{a) } x-2 \overline{) \begin{array}{l} x^3 - x^2 - 14x + 24 \\ \underline{-(x^3 - 2x^2)} \\ x^2 - 14x \\ \underline{-(x^2 - 2x)} \\ -12x + 24 \\ \underline{-(-12x + 24)} \\ 0 \end{array} \\
 \end{array}$$

$$\begin{aligned}
 y &= (x-2)(x^2+x-12) \\
 y &= (x-2)(x-3)(x+4) \\
 \text{Stretch Factor: } a &= 1
 \end{aligned}$$



b) Roots:

$$x = -4, 2, 3$$

c) y-int ($x=0$)

$$y = x^3 - x^2 - 14x + 24$$

$$y = 24$$

d) App. Local Max ($x=-1$)

$$y = (x-2)(x-3)(x+4)$$

$$y = (-3)(-4)(3)$$

$$y = 36$$

$$(-1, 36)$$

e) App Local Min ($x=2.5$)

$$y = (x-2)(x-3)(x+4)$$

$$y = (0.5)(-0.5)(6.5)$$

$$y = -\frac{13}{8} = -1.625$$

$$(2.5, -1.625)$$

3. Solve the following inequality and express your answer using *Interval*

Notation $x^3 - 9x \leq x^2 - 9$

$$x^3 - x^2 - 9x + 9 \leq 0$$

Where does this function have negative y values?

$$y = (x^3 - x^2)(9x + 9) \leftarrow \text{Factor}$$

$$y = x^2(x-1) - 9(x-1)$$

$$y = (x^2 - 9)(x-1)$$

$$y = (x+3)(x-3)(x-1)$$

① Roots

$$x = -3, 1, 3$$



③ $x \in (-\infty, -3] \cup [1, 3]$