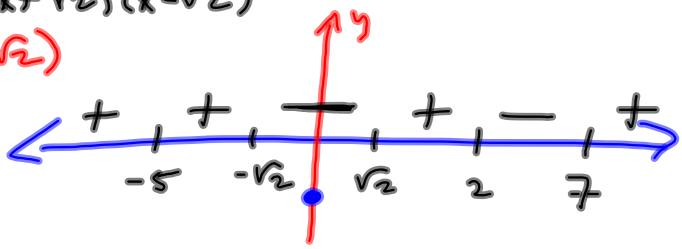
§3.6 II You should look @.

We'll be graphing things like ,

$$f(x) = (x-2)(x+5)^2(x-7)(x+\sqrt{2})(x-\sqrt{2})$$

$$f(0) = (-2)(5)^2\underset{1}{}(-7)\underset{2}{}(\sqrt{2})(-\sqrt{2})\underset{3}{}$$

$$\frac{(x-7)(x^2-2)}{(x-2)(x+5)^2}$$



and solve ≥ 0, > 0, < 0, ≤ 0 questions.

Find the domain of

$$f(x) = \sqrt{\frac{(x-7)(x^2-2)}{(x-2)(x+5)^2}}$$

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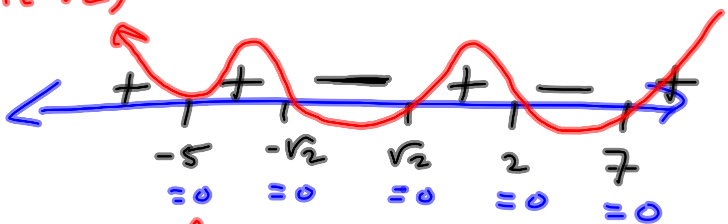
$f(x)=(x-2)(x+5)^2(x-7)(x+\sqrt{2})(x-\sqrt{2})$

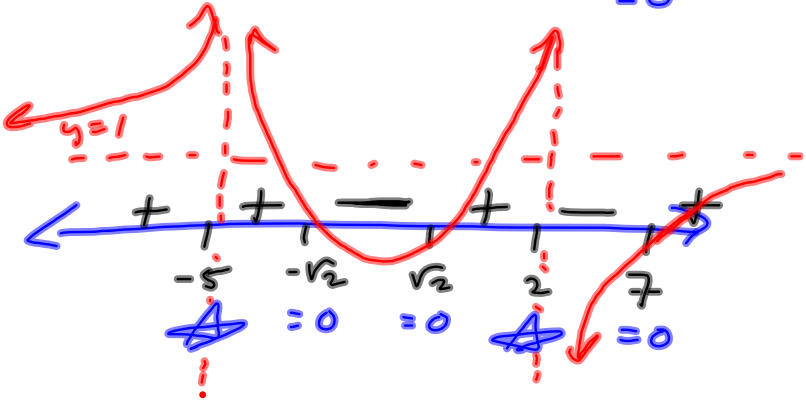
$f(0)=(-2)(5)^2(-7)(\sqrt{2})(-\sqrt{2})$

$(0,-2(5)^2(-7)(\sqrt{2})(-\sqrt{2}))=A$



H.A.: $\frac{(x)(x^2)}{x(x)^2}=\frac{x^3}{x^3}=1$ $y=1$

$$\frac{(x-7)(x^2-2)}{(x-2)(x+5)^2}$$



and solve ≥ 0, >0, <0, ≤ 0 questions.

Find the domain of

$$f(x)=\sqrt{\frac{(x-7)(x^2-2)}{(x-2)(x+5)^2}}$$

$D=(-\infty,-5)\cup(-5,-\sqrt{2}]\cup[\sqrt{2},2)\cup[7,\infty)$

$$f(x)=\sqrt{(x-7)(x^2-2)(x-2)(x+5)^2}$$

Means solve $(x-7)(x^2-2)(x-2)(x+5)^2\geq 0$

$$\underbrace{(-\infty,-5]\cup[-5,-\sqrt{2}]}_{[-\infty,-\sqrt{2}]}\cup[\sqrt{2},2]\cup[7,\infty)$$

Daren Madison

$g(x)=\ln((x-7)(x^2-2)(x-2)(x+5)^2)$

means solve $(x-7)(x^2-2)(x-2)(x+5)^2>0$

$g(x)=\ln(x-7)+\ln(x^2-2)+\ln(x-2)+\ln((x+5)^2)$

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Computers are adding machines

$10^6 \cdot 10^7 = 10^{6+7} = 10^{13}$

$(123{,}456)(542{,}777{,}888) = (10^{5.09\ldots})(10^{8.7346\ldots})$

Computer takes $\log(123{,}456) \approx 5.091512202$

$\log(542{,}777{,}888) \approx 8.734622$

$$\begin{array}{r} 5.091512202 \\ 8.734622 \\ \hline 13.82613435 \end{array}$$

$10^{13.82613435}$ = Product of those two big numbers.

Binomial Theorem (Pascal's Triangle)

Geometric Sums (Series)

$\sum$ - notation

$\sum_{k=1}^{5} k$ = Sum, from $k=1$ to $k=5$ of k.

$= 1+2+3+4+5$

$= 15$

$= \frac{5(6)}{2}$

$\sum_{k=1}^{100} k = 1+2+3+\cdots+98+99+100$

$= \frac{100(101)}{2}$

Gauss @ age 6.

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$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$$

$$3\cdot 2^{1-1} + 3\cdot 2^{2-1} + 3\cdot 2^{3-1} + 3\cdot 2^{4-1} + 3\cdot 2^{5-1}$$

$$\sum_{k=1}^{5} 3\cdot 2^{k-1} = 3\cdot 2^0 + 3\cdot 2^1 + 3\cdot 2^2 + 3\cdot 2^3 + 3\cdot 2^4$$

$$= 3 + 3\cdot 2 + 3\cdot 4 + 3\cdot 8 + 3\cdot 16 = 93$$

$$= 3\left(\frac{2^5-1}{2-1}\right) = 3\left(\frac{31}{1}\right) = 93$$

Geometric Sum;

$$\sum_{k=1}^{n} a\cdot r^{k-1} = a\left(\frac{r^n-1}{r-1}\right)$$

$$\sum_{k=1}^{50} \frac{1}{2}(13)^{k-1} = \frac{1}{2}\left(\frac{13^{50}-1}{13-1}\right) = \frac{1}{2} + \frac{1}{2}(13) + \cdots + \frac{1}{2}(13)^{49}$$

$$\begin{aligned} rS_n &= \phantom{a + {}} ar + ar^2 + ar^3 + \cdots + ar^{n-1} + ar^n \\ -S_n &= a + ar + ar^2 + ar^3 + \cdots + ar^{n-1} \\ \hline & -a + ar^n \quad = ar^n - a \end{aligned}$$

$$rS_n - S_n = ar^n - a$$

$$S_n(r-1) = a(r^n-1)$$

$$S_n = \frac{a(r^n-1)}{r-1} \text{ is Geometric Sum.}$$

Annuity:
"Simple ordinary annuity certain."
Fixed term.
Pmts @ end of each month.
interest calculated @ end of each month
(compounded monthly).

$\boxed{E}$ \$500 / month @ 6.2% compounded monthly, for 3 years.

$m = 12$
$n = mt = (12)(3) = 36$

$i = \frac{r}{m} = \frac{.062}{12}$

$R = pmt = \$500$

1st pmt: $A = 500\left(1 + \frac{.062}{12}\right)^{35} = R(1+i)^{n-1}$

2nd pmt: $A = 500\left(1 + \frac{.062}{12}\right)^{34} = R(1+i)^{n-2}$

$\vdots$

nth pmt: $A = 500\left(1 + \frac{.062}{12}\right)^{0} = R(1+i)^{0} = R$

FV of annuity:

$$S = R + R(1+i) + R(1+i)^2 + \cdots + R(1+i)^{34} + R(1+i)^{35}$$

$$= \sum_{k=1}^{36} R(1+i)^{k-1} = R\left(\frac{(1+i)^{36}-1}{(1+i)-1}\right) = R\left(\frac{(1+i)^{36}-1}{i}\right)$$

$$\sum_{k=1}^{n} ar^{k-1} = a\left(\frac{r^n-1}{r-1}\right)$$

$a = R$

$r = (1+i)$

$n = 36$

FV of annuity: $FV = R\left(\frac{(1+i)^n-1}{i}\right)$

\$500 = R , APR = 4%.
m = 12 ,

1. t = 10 yrs

2. t = 30 yrs

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3. Tell me what

$$\sum_{k=1}^{\infty} 3\left(\frac{2}{3}\right)^{k-1}$$ is.

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