18) $(n+3)(n+5i)(n-5i)$

$n^2 - 5ni + 5ni - 25i^2$ (-1)

$+25$

$(n+3)(n^2+25)$

$n^3 + 3n^2 + 25n + 75$

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19) $(r-1)(r+1)(r+2i)(r-2i)$

$r^2 + r - r - 1$ $\quad r^2 - 2ri + 2ri - 4i^2$ (-1)

$+4$

$(r^2-1)(r^2+4)$

$r^4 + 4r^2 - r^2 - 4$

$r^4 + 3r^2 - 4$

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Pg 19

1) $\frac{2}{3}, -1, -3-i, -3+i$ $\quad -b \pm \sqrt{-1}$

$-3 \pm \sqrt{-1}$

$-3 \pm i$

quad

$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

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3) $i, 3+\sqrt{2}, -i, 3-\sqrt{2}$

quad

$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

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5) $\frac{5}{4}, \frac{1}{2}, \sqrt{7}, -\sqrt{7}$

$\sqrt{x^2} = \sqrt{7}$

$x = \pm\sqrt{7}$

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7) $-3+\sqrt{3}, 1+\sqrt{2}$

$-3-\sqrt{3}, 1-\sqrt{2}$

9) $-2, -1-i, -2+2i$

$-1+i, -2-2i$

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11) $-1, 4, -5 = x$ roots

$x=-1 \quad x=4 \quad x=-5$

$(x+1)(x-4)(x+5)$ factors

$(x+1)(x^2-x-20)$ Poly. Func

$x^3-x^2-20x+x^2-x-20$

x^3

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13) $-1, -3i, 3i$ roots

$(x+1)(x+3i)(x-3i)$ factors

$x^3-3xi+3xi-9i^2$ poly func.

$+9$ (-1)

$(x+1)(x^2+9)$

x^3+x^2+9x+9

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(15) $3, 2i,$

$(x-3)(x+2i)(x-2i)$

$(x-3)(x^2+4)$

$x^3+4x-3x^2-12$

$x^3-3x^2+4x-12$

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14) $-2, 0, -5, 3$ $x=0$

$x(x+2)(x+5)(x-3)$

$(x^2+2x)(x^2+2x-15)$

$(x=0)$

$(x=0)$

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19) (1) mult. 2, 4 times

1, 1, 4

$(x-1)(x-1)(x-4)$

23) $-5, -5, 1$

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5 mult. 3

5, 5, 5,

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21) 3, 0, 2

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① $f(x) = -(3)(1)(-5)^2 (x+3)(x+1)(x-5)^2$

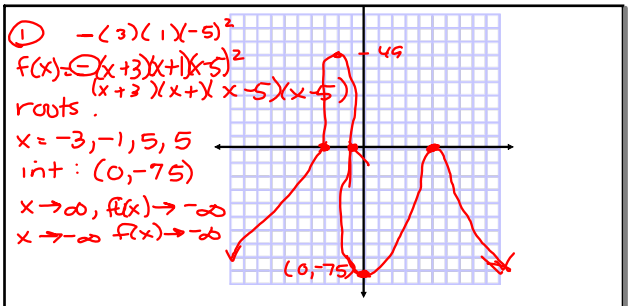
$(x+3)(x+1)(x-5)(x-5)$

roots: $x = -3, -1, 5, 5$

int: $(0, -75)$

$x \to \infty, f(x) \to -\infty$

$x \to -\infty, f(x) \to -\infty$



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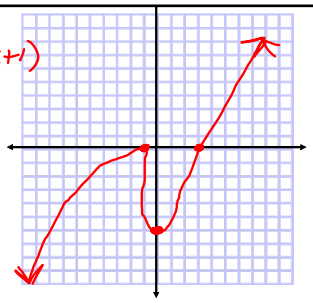
② $f(x) = 2(-3)(1)(1)(x-3)(x+1)(x+1)$

$f(x) = 2(x-3)(x+1)^2$

roots: $3, -1, -1$

y int: $(0, -6)$



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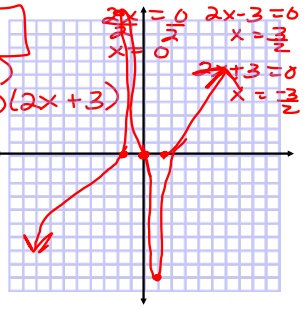
③ $f(x) = 8x^3 - 18x$

$= 2x(4x^2 - 9)$

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

$x = 0, \frac{3}{2}, -\frac{3}{2}$

$(0,0)$ y int



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6) $(x^2 - 13)$

$\sqrt{x^2} = \pm\sqrt{13}$

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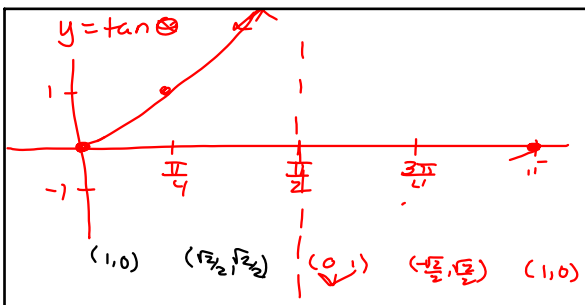
$y = \tan\theta$



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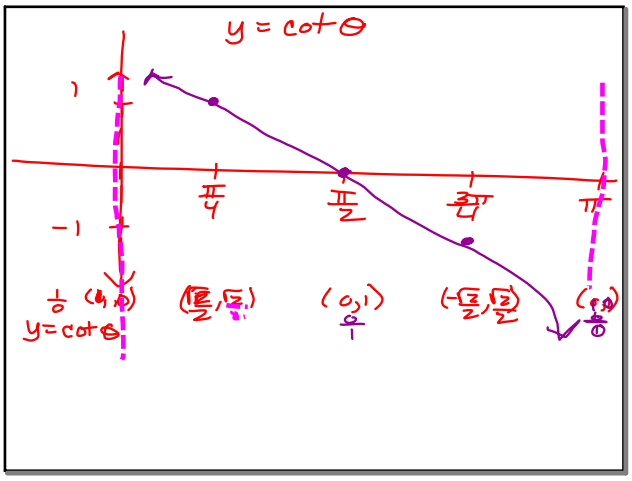

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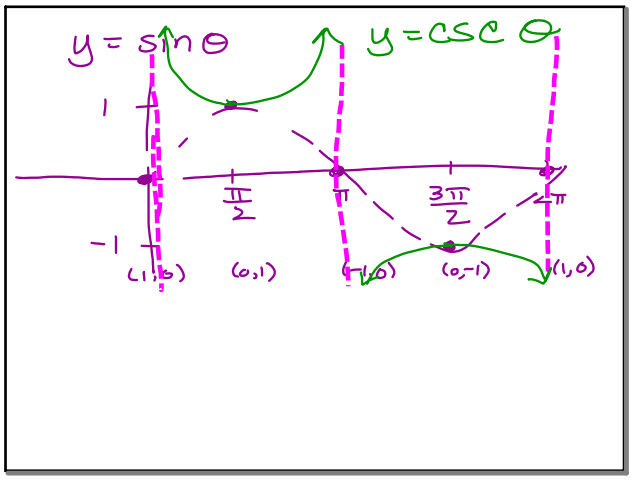

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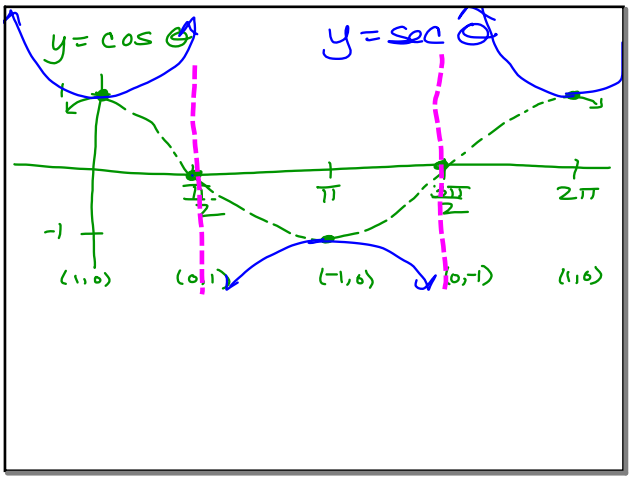

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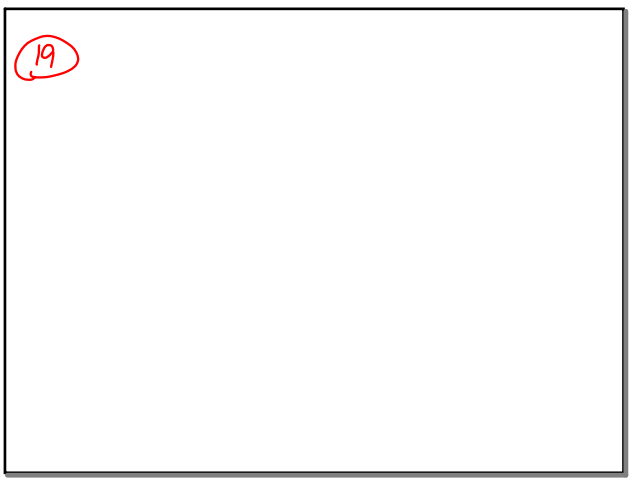

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