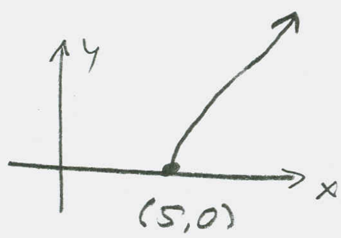
201 §1.4 #5 1, 3, 15, 22, 25, 26, 35

① Use calculator to determine which viewing rectangle produces the most appropriate graph of $f(x) = \sqrt{x^3 - 5x^2} = |x|\sqrt{x-5}$

(a) $[-5,5] \times [-5,5]$ misses entire graph.

(b) $[0,10] \times [0,2]$ misses entire graph

(c) $[0,10] \times [0,10]$ is best, since $\mathcal{D} = [5,\infty)$



③ Sketch the graph: Give viewing rectangle.

$f(x) = -x^2 + 20x + 5$

$\boxed{[-2,25] \times [-10,120]}$

Scratch:

$= -(x^2 - 20x + 10^2 - 10^2) + 5$

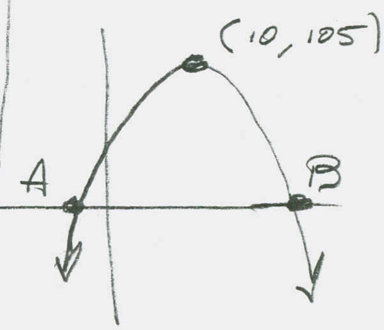
$= -(x^2 - 20x + 10^2) - (-10^2) + 5$

$= -(x-10)^2 + 100 + 5$

$= -(x-10)^2 + 105 \overset{\text{SET}}{=} 0$

$x - 10 = \pm\sqrt{105}$

$x = 10 \pm \sqrt{105}$



$A = (10 - \sqrt{105}, 0)$

$\approx (-.2470, 0)$

$B = (10 + \sqrt{105}, 0)$

$\approx (20.2470, 0)$

3 | 105
5 | 35
7

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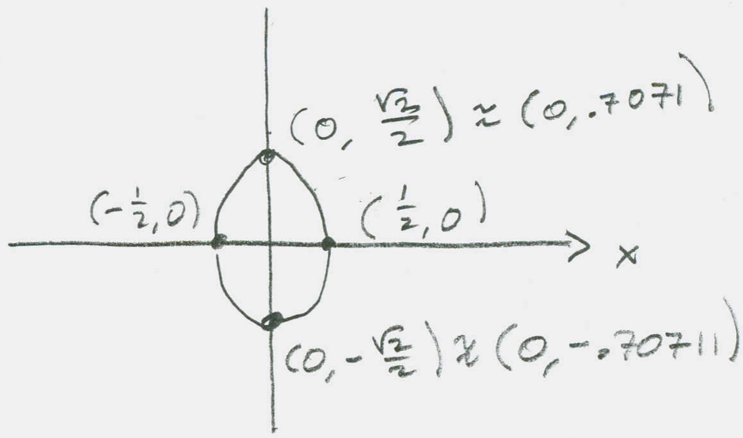
(15) Graph $4x^2+2y^2=1$ by graphing its top & bottom halves as functions:

$$4x^2+2y^2=1$$

$$2y^2=-4x^2+1$$

$$y^2=\frac{1}{2}-2x^2$$

$$y=\pm\sqrt{\frac{1}{2}-2x^2}$$



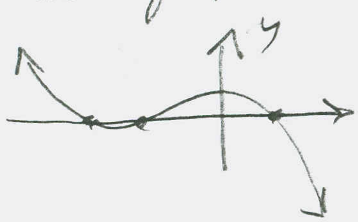
$y=\sqrt{\frac{1}{2}-2x^2}$ is top

$y=-\sqrt{\frac{1}{2}-2x^2}$ is bottom

(22) $\cos x = x$ has one soln (see E9).

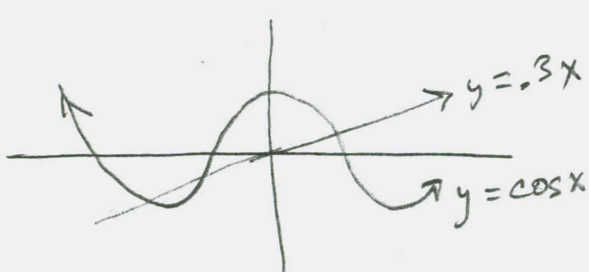
$\cos x = .3x$ has three.

(a) Use grapher to show



$[-4.89, 2.34] \times [-1.29, 1.29]$

Graph of $\cos x - .3x$ has 3 x-intercepts.



Same window. Graph of $\cos x$ & $.3x$ separately.

This picture shows that somewhere between $y=x$ & $y=.3x$, there's one that just

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(22) Cn't'd

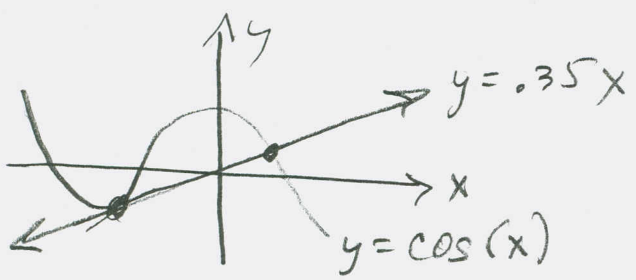
... grazes (is tangent to) cos (x) in the 3rd quadrant.

(b) Find m ∋ cos x = mx has 2 solutions.

.5 x too steep

.4 x " "

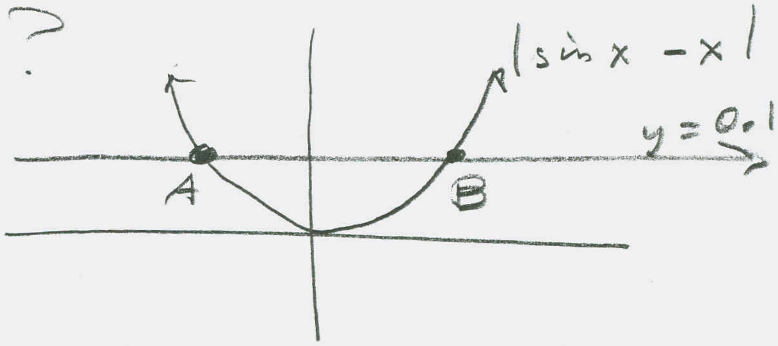
.35 x Looks darn close, with this graph:



(25) For what values of x is it true that

$|\sin x - x| < 0.1$?

$[-5, 5] \times [-1, 1]$



A ≈ (−.85375, .1)

B ≈ (.85375, .1)

I'd choose $\boxed{x \in (-.85375, .85375)}$

(26) We graph $3x^5 - 5x^3 + 2x$ and $3x^5$ on same screen and make observations for the given viewing rectangles.

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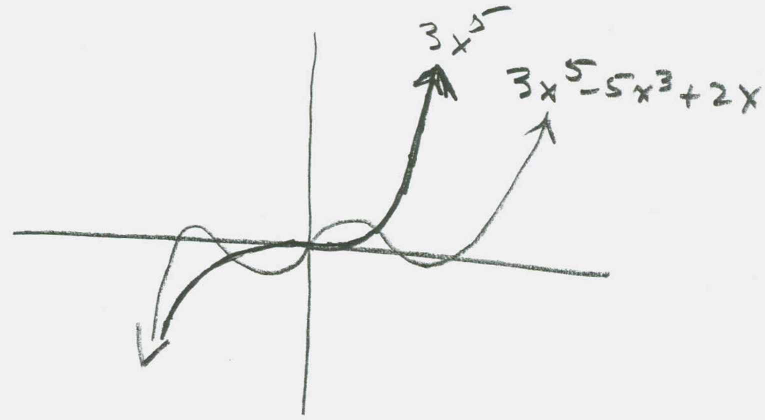
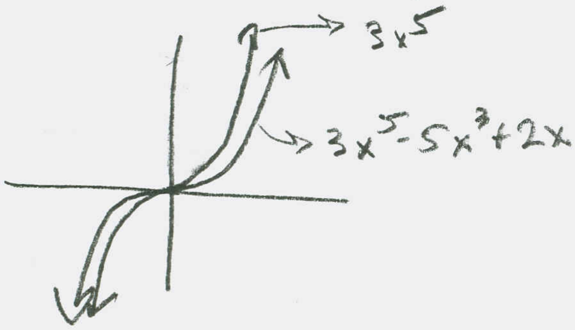
(26) cnt'd

$[-2,2] \times [-2,2]$

They appear quite different. $3x^3$ only has $(0,0)$ as x-intercept.

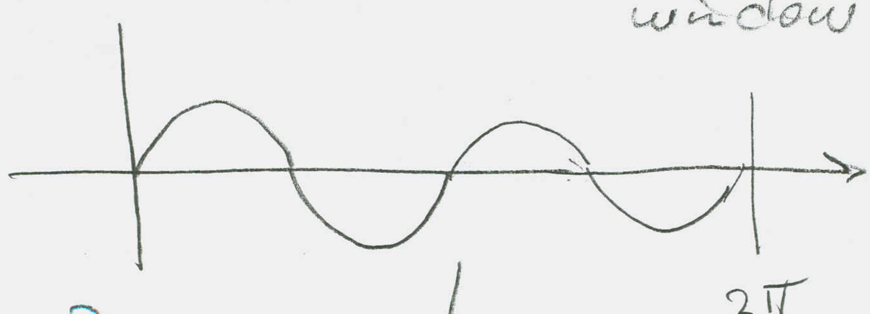


$[-10,10] \times [-10000, 10000]$ I expect them to look almost identical. We lose the finer features that appear in the 1^{st} graph



$3x^5$ is the "taller" one (un-slowed by $-5x^3$ - term)

(35) What's going on when $\sin(96x)$ looks just like $\sin(2x)$? in $[0,2\pi] \times [-1.2, 1.2]$ window?



It's PIXELATED!