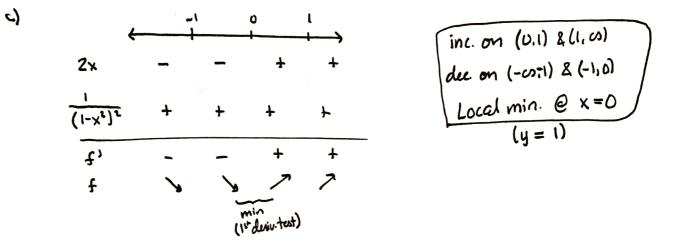
(2)
$$g(x) = \frac{1}{1 - x^2}$$

a) $g'(x) = -\frac{1}{(1 - x^2)^2} \cdot (-2x) = \frac{2x}{(1 - x^2)^2}$

b) [x=0] (where g'(x)=0). Note that g'(x) is undefined at $\underline{x=\pm 1}$. but there is are not technically with numbers since they aren't in the domain of g itself. But they are still spots where f may change from inc. to dec. (& vice versa).



(3)
$$h(x) = x^{2/3} (2-x)$$

a) $h'(x) = \frac{2}{3} x^{-1/3} (2-x) + x^{2/3} (-1)$
 $= \frac{2}{3} \cdot 2x^{-1/3} - \frac{2}{3} x^{2/3} - x^{1/3} = \frac{4}{3} x^{-1/3} - \frac{5}{3} x^{2/3}$
 $= \frac{1}{3} x^{-1/3} \left[4 - 5 x \right]$
cont. pts: $x=0$ (when $h'(x)$ is undefinducto dividity o)
 $g(x=4/5)$ (when $4-5x=0$)

inc. on (0,415) dec. on (-0,0) & (415,00) Local min@ X=0 Local max @ X=415

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

a) $f'(x) = 3x^{2}+6x$
 $= 3x(x+2)$
b) $\boxed{x=0 \ 8-2}$ where $f'(x)=0$ (undefined nowhere)
c) $\underbrace{x=0 \ 8-2}_{3x}$ where $f'(x)=0$ (undefined $\underbrace{x=0, \ y=-1}_{3x}$ (-2,3)
Local min $(0^{3}-1)$ $\underbrace{x=0, \ y=-1}_{3x}$
d) $f''(x)=6x+6=6(x+1)$
e) $f''(x)=0 \ ex=-1, \ 8 \ 5'' \ 0$ verses undefined.
f(x) = 0 \ (x=-1, \ 8 \ 5'' \ 0 verses undefined.
conc. up on $(-1, co)$
conc. down on $(-co, -1)$ inflection $\underbrace{ex=-1, \ y=f(-1)=-1+3-1}_{ie. \ (-1, 1]}$

- (b) For each critical number you found, determine whether it is a local max, local min, or neither.
- (c) Is f''(-2) positive or negative? From this, what can you say about the concavity of the original function f(x) at x = -2?
- 5. Let $f(x) = x^3 + 3x^2 1$.
 - (a) Compute f'(x) and factor it.
 - (b) Determine the critical numbers of f(x).
 - (c) Find the intervals on which f(x) is increasing and decreasing, and list any local min(s) and max(s). Give both the x and y-coordinates.
 - (d) Compute f''(x).
 - (e) Find the intervals on which f(x) is concave up and concave down, and list any inflection point(s). Give both x and y-coordinates for these.
 - (f) Plot the local min(s) and max(s) you found in in parts (5c) and (5e) on the axes below (or on your own sheet of paper). Use these to give a rough sketch of the curve. Make sure it is increasing/decreasing on the right intervals, and concave up/down in the right places.

