AP CALC Ch 2 Rev 2

CALC

① $\lim_{x\to 0} 1-x^4 = 1$ $\quad \lim_{x\to 0} 1+2x^2 = 1$ } thus since $1-x^4 \le f(x) \le 1+2x^2$ By squeeze thm $\lim_{x\to 0} f(x) = 1$

② ave rate of change → $\dfrac{f(4)-f(-1)}{4--1} = \dfrac{-255-0}{5} = \boxed{-51}$

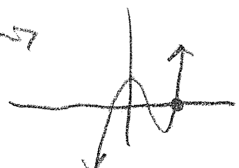
③ $P(1,-1)$ $Q(x, 2x^2-3)$

ⓐ $\lim_{x\to 1} \dfrac{2x^2-3--1}{x-1} = \lim_{x\to 1} \dfrac{2x^2-2}{x-1} = \lim_{x\to 1} \dfrac{2\cancel{(x-1)}(x+1)}{\cancel{(x-1)}} = \boxed{4} = m$

$\boxed{y+1=4(x-1)}$

ⓑ NORMAL MEANS ⊥ → thus $m = -\frac{1}{4}$ $\boxed{y+1 = -\frac{1}{4}(x-1)}$

④ GRAPH →



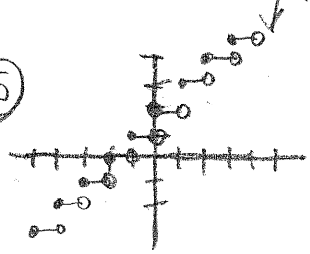
You can see 3 roots, lets prove 1 of them by IVT } Let's find $f(1)$ & $f(2)$

$f(1) = -2$

$f(2) = 13$

> since there is a sign change, by IVT there must be an intermediate value which is 0.

⑤



No CALC

① $P(2,2)$ $Q(x, 3x^2-5x)$

$\lim_{x\to 2} \dfrac{3x^2-5x-2}{x-2} = \lim_{x\to 2} \dfrac{(3x+1)\cancel{(x-2)}}{\cancel{x-2}} = \boxed{7} = m$ } $\boxed{y-2=7(x-2)}$

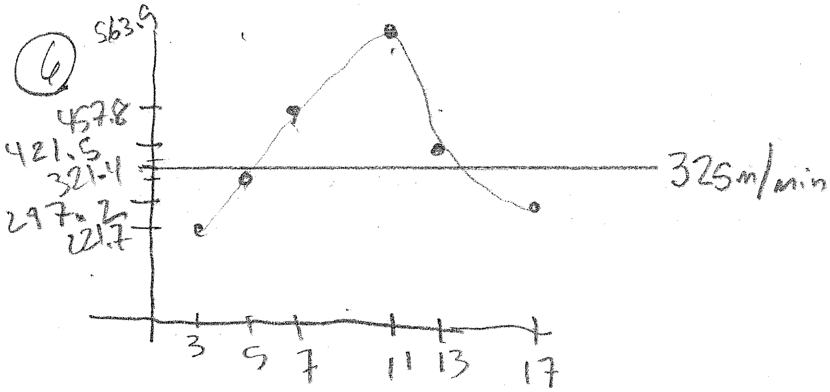
NORMAL $\boxed{y-2 = \frac{-1}{7}(x-2)}$

② ⓐ $a-1$ ⓑ 2 ⓒ FOR CONT. Need $1^- = 1^+$

$a-1=2$ $\boxed{a=3}$

(3-5) See attached

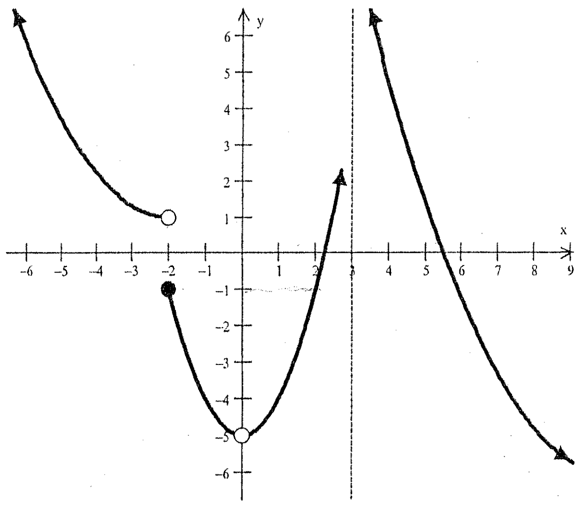
⑥



Since continuous, by IVT there must be 2 values at which $v(t) = 325$ m/min

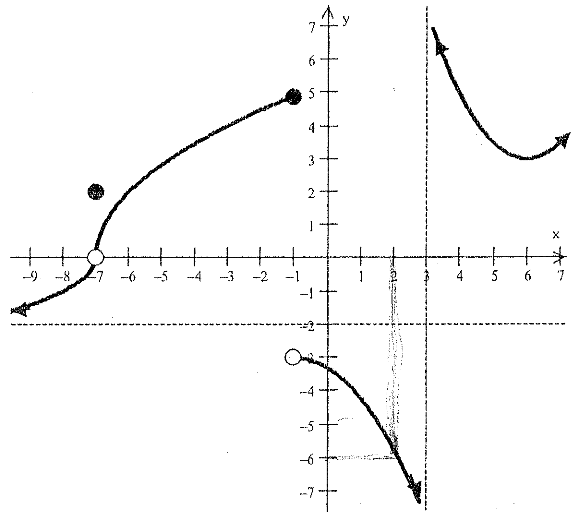
3.

Below is the graph of $f(x)$



4.

Below is the graph of $g(x)$



$\lim_{x\to-\infty} f(x) = \infty$ $\quad \lim_{x\to\infty} f(x) = -\infty$ $\quad \lim_{x\to-\infty} g(x) = -2$ $\quad \lim_{x\to\infty} g(x) = \infty$

$\lim_{x\to-2^-} f(x) = 1$ $\quad \lim_{x\to-2^+} f(x) = -1$ $\quad \lim_{x\to-2} f(x) = \text{DNE}$ $\quad \lim_{x\to-7^-} g(x) = 0$ $\quad \lim_{x\to-7^+} g(x) = 0$ $\quad \lim_{x\to-7} g(x) = 0$

$\lim_{x\to0^-} f(x) = -5$ $\quad \lim_{x\to0^+} f(x) = -5$ $\quad \lim_{x\to0} f(x) = -5$ $\quad \lim_{x\to-1^-} g(x) = 5$ $\quad \lim_{x\to-1^+} g(x) = -3$ $\quad \lim_{x\to-1} g(x) = \text{DNE}$

$\lim_{x\to3^-} f(x) = \infty$ $\quad \lim_{x\to3^+} f(x) = \infty$ $\quad \lim_{x\to3} f(x) = \infty$ $\quad \lim_{x\to3^-} g(x) = -\infty$ $\quad \lim_{x\to3^+} g(x) = \infty$ $\quad \lim_{x\to3} g(x) = \text{DNE}$

On what intervals is $f(x)$ is continuous? On what intervals is $g(x)$ is continuous?

$(-\infty,-2)\cup(-2,0)\cup(0,3)\cup(3,\infty)$ $\qquad (-\infty,-7)\cup(-7,-1)\cup(-1,3)\cup(3,\infty)$

5. Use the graphs above to find:

a) find $\lim_{x\to2}[f(x)\cdot g(x)]$ $\quad (-1)(-6) = \boxed{6}$

b) find $\lim_{x\to2}\frac{g(x)}{f(x)} = \frac{-6}{-1} = \boxed{6}$

c) find $\lim_{x\to-7}[x+g(x)]$ $\quad -7+0 = \boxed{-7}$

6. The table below shows several measurements of the velocity of motorcycle driving on a straight road. $v(t)$ is continuous on the interval $[3,17]$.

t (min)	3	5	7	11	13	17
$v(t)$ (meters/min)	221.7	321.4	457.8	563.9	421.5	297.2

What is the least number of times where $v(t)$ is exactly 325 meters/min? Justify your answer.