Math 15 Review for final exam	
1	Find the limit (if it exists; if not explain why): A. $\lim_{x\to\infty} \frac{6x^7-100x^4+300}{2x^6-1000x^5}$ B. $\lim_{x\to 6} \frac{\sqrt{x-2}-2}{x-6}$ C. $\lim_{x\to 3} \frac{x-3}{x^2-5x+6}$ D. $\lim_{x\to 3} \begin{cases} 3x+2, & x<3 \\ 2x+1, & x\geq 3 \end{cases}$ E. $\lim_{x\to 2^+} \frac{x-3}{(x-1)(x-5)}$ F. $\lim_{x\to 5} \frac{\lvert x-5\rvert}{x-5}$ G. $\lim_{x\to\infty} \frac{5x^7-100x^2}{4x^8+10x}$ H. $\lim_{x\to 0} \frac{\sin 3x}{\sin 7x}$
2	Compute $\frac{dy}{dx}$ of the following functions: A. $y = 5x^7\sqrt[3]{10x^2+3}$ B. $y = \frac{3x^2+10}{\sqrt[3]{x^2+4}}$ C. $y = x^5(sin3x+10)^5$ D. $xy^2+5x^3+2y=9$ E. $y = (u^2+2u)^2,\ \ and\ u = \sqrt{x}+2$ F. $y = [3x+(5x+7)^{10}]^4$ G. $y = \sec 5x$
3	Integrate: A. $\int(3x^7+8\sqrt[3]{x}+5)dx$ B. $\int \frac{7x^6-8x^3}{\sqrt[3]{x}}dx$ C. $\int_1^2 (x^2+2)dx$

	D. $\int \frac{x}{\sqrt{x^2+10}} dx$ E. $\int x(x-1)^8 dx$ F. $\int \frac{1}{t^2}\left(1+\frac{1}{t}\right)^{10} dt$
4	Recall: $f(x)$ is continuous at $x = c$ if $I.\ f(c)\ exists$ $II. \lim_{x \to c} f(x)$ exists $III.\ \lim_{x \to c} f(x) = f(c)$ For A-D circle the roman numerals that are true for $f(x)\ and\ c$. A. $f(x) = \frac{x-5}{x-2}, c = 7$: $I \quad II \quad III$ B. $f(x) = 3x^2 + 5x - 2,\ c = 3$: $I \ II \ III$ C. $f(x) = \frac{x-3}{x^2-5x+6},\quad c = 3\ and\ c = 2$: $I \quad II \quad III$ D. $f(x) = \frac{\lvert x-3 \rvert}{x-3},\ \ c = 3$: $I \quad II \quad III$
5	The position after t seconds of a particle moving along the x-axis is given by $x(t) = t^2 - 10t + 1$. Find A. The position after 2 seconds. B. When the particle changes direction. C. The position when the particle changes direction. D. The acceleration after 2 seconds.
6	A square on a computer screen is increasing in size. The area is increasing at the rate of 2 $\frac{cm^2}{min}$. When the side of the square is 10 cm long, find the rate at which the side of the square in increasing.
7	Find where $f(x) = x^4 - 8x^2$ in increasing and decreasing, concave up and concave down. Find any max, min points ,inflection points and asymptotes.
8	Given that $3x + y = 12,\ maximize\ A = xy$.
9	A yard bordering on a river has a perimeter of 150 feet. What are the dimensions if the area is maximum.
10	A projectile is shot in the air from the ground. The position of the projectile after t seconds is given by $s(t) = -16t^2 + 64t$. A) Find the initial velocity. B) When does the projectile reach a maximum height? C) What is the maximum height? D) When does the profectile return to the ground? E) What is the velocity when the projectile hits the ground?
11	A volume is changing over time. The volume is given by $V = 3xy^2$, where $x\ and\ y$ are also changing with time. If $\frac{dv}{dt} = 5$, and $x = 2y$, find $\frac{dy}{dt}$ when $y = 4$.

12	For $f(x) = 3x^2 + 2, on\ [1,3]$, A)find the average value of the function. B) find the average rate of change of the function.
13	A) $\frac{d}{dx}\int_{-3}^{x} \cos t\, dt$ B) $\frac{d}{dx}\int_{2}^{x^2} \sqrt{t^3+1}\, dt$