Midtern Exam I Solution.

#1.
$$y = \sqrt{1} + \frac{1}{x^3} + 2\sqrt{x}$$
 $\frac{dy}{dx} = 0 - \frac{3}{x^4} + \frac{1}{\sqrt{x}}$
 $= -\frac{3}{x^4} + \frac{1}{\sqrt{x}}$
 $= -\frac{3}{x^4} + \frac{1}{\sqrt{x}}$

#2. $y = e^2 + \frac{1}{e} + 3e^x + 2lu(x)$
 $\frac{dy}{dx} = 0 + 3e^x + \frac{2}{x}$
 $= 3e^x + \frac{2}{x}$
 $= 3e^x + \frac{2}{x}$

#3. $f(t) = \frac{x^2}{t^2} + \frac{t^2}{x^2} + tx$
 $f'(t) = -\frac{2x^2}{t^3} + \frac{2t}{x^2} + x$

#4. $P(c) = \pi \cos(\pi x) + \frac{x}{c} + c + ce^x$
 $P(c) = \pi \cos(\pi x) - \frac{x}{c^2} + 1 + e^x$

#5. point: $(0, y|_{x=0} = 1)$.

Slope: $y'|_{x=0} = 2e^{2x} + 2|_{x=0} = 4$.

#6. point: $(0, y|_{x=0} = 1)$

Slope: $y'|_{x=0} = 1 - \sin x|_{x=0} = 1$.

4=) y = x+1

#1. Point:
$$(2,1)$$

Slope: $dy = ?$
 $dx = ?$
 $dx^2 + 8y^2 = 25$

Implicit

 $dy = 8x + 13y dy = 0.$
 $dy = 8x - 4x - 8y$
 $dx = -18y = 9y = 7$

So $y = 1 = -\frac{8}{7}(x-2) = -\frac{8}{7}x + \frac{16}{7}$

#8. Point $(\sqrt{2}, 1)$

Slope: $dy = -\frac{7}{7}x + \frac{25}{7}$

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#9. $x^2 - y^2 = 1$
 $x^2 - y^2$

#11. p	$(l) = ln (l^2 + sin l)$	Chair rule:
P	$(l) = 2l + \cos l$ $l^2 + \sin l$	$\frac{dA}{dt} = \frac{\sqrt{3}}{2} a \frac{da}{dt} \dots \otimes$
	l ² +sin.l	at = = = = =
# 12. 6	$\chi(\pi) = \cos(\sin(\pi^2))$	Another given condition Says
	$V(\pi) = -\sin\left(\sin(\pi^2)\right)\left(\sin(\pi^2)\right)$	When Area = 453, we're
	= $-\sin(\sin(\pi^2))\cos(\pi^2)\cdot 2\pi$.	supposed to fond da.
	$= -2\pi Sin(sin(\pi^2)) cos(\pi^2).$	
#13. h(t) = 64 - 18t2	From $A = 4\sqrt{3} = \frac{\sqrt{3}}{4} a^2$,
1.	$t_1 = -gt$	Henre da daru
h"t	t) = - g [acceleration]	Hence $\frac{da}{dt} = \frac{dA/At}{\sqrt{3}}$
When +	t) = -g [acceleration] ———————————————————————————————————	13 a
h(t) is zero.	= 3
	$64 - \frac{1}{2}gt^2$.	\frac{\sqrt{3}}{2} \cdot 4
		$=\left(\frac{\sqrt{3}}{2}\right)$
+-=	= 128 Hence when	2
t-=	g. Hence when	$=\frac{\sqrt{3}}{2}$ #16. $\sqrt{(a)} = \sqrt{2} a^3$
t = t=	128. Hence when 8 12 the object hits the	#16. $V(a) = \sqrt{2} a^3$
t = t=	8 12 the object hits the ground.	#16. $V(a) = \sqrt{2} a^3$. Given that $\frac{dV}{dt} = 120$ which $\frac{3}{2}$.
t = t=	8 12 the object hits the ground.	#16. $V(a) = \sqrt{2} a^3$. Given that $\frac{dV}{dt} = 120$ which $\frac{3}{2}$.
t = t = grand Hence the	8 = the object hits the ground. Velocity at typond is	#16. $V(a) = \sqrt{2} a^3$. Given that $\frac{dV}{dt} = 120$ which $\frac{3}{2}$.
t = t = grand Hence the	$8\sqrt{\frac{2}{3}}$ the object hits the grand. Velocity at typiand is and $)=-9\cdot 8\sqrt{\frac{2}{3}}=-8\sqrt{29}$.	#16. $V(a) = \sqrt{2} a^3$
Hence the	8 $\sqrt{\frac{2}{3}}$, the object hits the grand. Velocity at typind is and) = $-9 \cdot 8 \sqrt{\frac{2}{3}} = -8 \sqrt{29}$. $\sqrt{\frac{1}{3}} = -\frac{1}{2} \sqrt{\frac{1}{3}} = -\frac{1}{2} $	#16. $V(a) = \frac{\sqrt{2}}{12} a^{3}$. Given that $\frac{dV}{dt} = 120$ when $\sqrt{a} = \frac{8\sqrt{2}}{12} = \frac{\sqrt{2}}{12} a^{3}$. Let $a^{3} = 8$
Hence the V'(tga #14. x(t):	8 $\sqrt{\frac{2}{3}}$, the object hits the grand. Velocity at typind is and) = $-9 \cdot 8 \sqrt{\frac{2}{3}} = -8 \sqrt{\frac{2}{3}}$. $-\frac{4^{4}+2t}{1}$ $-\frac{4^{4}+2t}{1}$ $-\frac{4^{4}+2t}{1}$ $-\frac{4^{4}+2t}{1}$ $-\frac{4^{4}+2t}{1}$ $-\frac{4^{4}+2t}{1}$	#16. $V(a) = \frac{\sqrt{2}}{12} a^{3}$ Given that $\frac{dV}{dt} = 120$ when $\sqrt{(a)} = \frac{8\sqrt{2}}{\sqrt{12}} = \frac{\sqrt{2}}{12} a^{3}$ (=) $a^{3} = 8$ So $a = 2$. Chain rule:
Hence the V'(tga #14. x(t):	8 $\sqrt{\frac{2}{3}}$ the object hits the grand. Velocity at typically is and $) = -9 \cdot 8 \sqrt{\frac{2}{3}} = -8 \sqrt{\frac{2}{3}}$. $\sqrt{\frac{4}{3}} + 2 + \frac{4}{3} + 2 = 4 + \frac{1}{3} = 6$.	#16. $V(a) = \frac{\sqrt{2}}{12} a^{3}$. Given that $\frac{dV}{dt} = 120$ which $\frac{3}{560}$. When $V(a) = \frac{8\sqrt{2}}{12} = \frac{\sqrt{2}}{12} a^{3}$. (=) $a^{3} = 8$ So $a = 2$.
Hence the V'(tgo #14. x(t).	8 $\sqrt{\frac{2}{3}}$ the object hits the grand. Velocity at typically is and $) = -9 \cdot 8 \sqrt{\frac{2}{3}} = -8 \sqrt{\frac{2}{3}}$. $\sqrt{\frac{4}{3}} + 2 + \frac{4}{3} + 2 = 4 + \frac{1}{3} = 6$.	#16. $V(a) = \frac{\sqrt{2}}{12} a^{3}$ Given that $\frac{dV}{dt} = 120$ when $\sqrt{a} = \frac{8\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{12} a^{3}$ When $\sqrt{a} = \frac{8\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{12} a^{3}$ $= \sqrt{a} = 8$ So $a = 2$. Chain rule: $\frac{dV}{dt} = \frac{\sqrt{2}}{4} a^{2} \frac{da}{dt} = 120$.
# 14. x(t): *** *** *** *** *** *** ** **	8 $\sqrt{\frac{2}{3}}$ the object hits the grand. Velocity at typical is and) = $-9 \cdot 8 \sqrt{\frac{2}{3}} = -8 \sqrt{\frac{2}{3}}$. $\sqrt{\frac{1}{3}} = 4 + 2 + 2 = 4 + 1 = 1 = 12 + 2 = 12 = 12 = 12 = 12 = $	#16. $V(a) = \frac{\sqrt{2}}{12} a^{3}$ Given that $\frac{dV}{dt} = 120$ when $\sqrt{(a)} = \frac{8\sqrt{2}}{\sqrt{12}} = \frac{\sqrt{2}}{12} a^{3}$ (=) $a^{3} = 8$ So $a = 2$. Chain rule:
Hence the V'(type #14. x(t): whi= x'(t) a(t)= x''(t)	8 $\sqrt{\frac{2}{3}}$, the object hits the grand. Velocity at typand is and) = $-g \cdot 8 \sqrt{\frac{2}{3}} = -8\sqrt{\frac{2}{3}}$. $t^{4} + 2t$ $= 4t^{3} + 2$ $= 12t^{2}$ $= 12t^{2}$ $= 12t^{2}$ $= 13t^{2}$	#16. $V(a) = \frac{\sqrt{2}}{12} a^{3}$ Given that $\frac{dV}{dt} = 120$ when $\sqrt{a} = \frac{8\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{12} a^{3}$ When $\sqrt{a} = \frac{8\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{12} a^{3}$ $= \sqrt{a} = 8$ So $a = 2$. Chain rule: $\frac{dV}{dt} = \frac{\sqrt{2}}{4} a^{2} \frac{da}{dt} = 120$.
Hence the V'(type #14. x(t): whi= x'(t) a(t)= x''(t)	8 $\sqrt{\frac{2}{3}}$, the object hits the grand. Velocity at typand is and) = $-g \cdot 8 \sqrt{\frac{2}{3}} = -8\sqrt{\frac{2}{3}}$. $t^{4} + 2t$ $= 4t^{3} + 2$ $= 12t^{2}$ $= 12t^{2}$ $= 12t^{2}$ $= 13t^{2}$	#16. $V(a) = \frac{\sqrt{2}}{12} a^{3}$ Given that $\frac{dV}{dt} = 120$ when $\sqrt{a} = \frac{8\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{12} a^{3}$ When $\sqrt{a} = \frac{8\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{12} a^{3}$ $= \sqrt{a} = 8$ So $a = 2$. Chain rule: $\frac{dV}{dt} = \frac{\sqrt{2}}{4} a^{2} \frac{da}{dt} = 120$.
Hence the V'(type #14. x(t): whi= x'(t) a(t)= x''(t)	8 $\sqrt{3}$ the object hits the grand. Velocity at typical is and) = $-9 \cdot 8 \sqrt{\frac{2}{3}} = -8 \sqrt{\frac{2}{3}}$. $\sqrt{4} + 2 \cdot \frac{1}{3} = 2 \cdot \frac{1}{3}$ $= 12t^2$ $= 3 \cdot \text{inch}^2/\text{See} : 3 \cdot \text{iven}$.	#16. $V(a) = \frac{\sqrt{2}}{12} a^{3}$ Given that $\frac{dV}{dt} = 120$ when $\sqrt{a} = \frac{8\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{12} a^{3}$ When $\sqrt{a} = \frac{8\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{12} a^{3}$ $= \sqrt{a} = 8$ So $a = 2$. Chain rule: $\frac{dV}{dt} = \frac{\sqrt{2}}{4} a^{2} \frac{da}{dt} = 120$.

#19.
$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$= \lim_{h \to 0} \frac{2(x+h)^{2} - 1 - (3x^{2} - 1)}{h}$$

$$= \lim_{h \to 0} \frac{2x^{2} + 4xh + 3h^{2} - 1 - 2x^{2} + 1}{h}$$

$$= \lim_{h \to 0} \frac{4xk + 2h^{2}}{h} = 4x$$

$$= \lim_{h \to 0} \frac{(x+h) - f(x)}{h}$$

$$= \lim_{h \to 0} \frac{(x+h)^{2} + (x+h) - (x^{2} + x)}{h}$$

$$= \lim_{h \to 0} \frac{x^{2} + 2xh + h^{2} + h}{h} = 2x + 1$$