(Problem 8 on page "11")

8. (a)
$$(-\sqrt{\frac{5}{2}}, 0)$$
 and $\sqrt{5}2, 0)$

(b) The slopes of the tangent lines at these point are both -4.

1. (16 points) Find the derivatives of the following functions. You do not have to simplify.

4 pt (a)
$$f(x) = \left(3\cos(x) + \frac{7}{x^2}\right)^4$$

$$\int_{-2\rho t}^{3} (x) = 4 \left(3 \cos(x) + \frac{7}{x^2} \right)^3 \left(-3 \sin(x) - 2 \cdot \frac{7}{x^3} \right)$$

4 pt (b)
$$g(x) = \frac{xe^x}{\arcsin x}$$

$$g'(x) = \frac{(xe^{x})^{2}acsnux - xe^{x}(acsnux)}{acsnu^{2}x}$$

$$= \frac{(e^{x}+xe^{x})acsnux - xe^{x}}{acsnux - xe^{x}}$$

$$= \frac{(e^{x}+xe^{x})acsnux - xe^{x}}{acsn$$

$$= \frac{(e^{x} + x e^{x}) answx - x e^{x} \sqrt{1-x^{2}}}{answx}$$

continued on next page

1. continued.

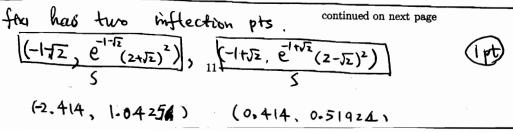
(c) $y = (\sqrt{x})^{\sqrt{x}}$ (Your final answer should be a function of x.)

tipt
$$\begin{cases} \frac{dy}{dx} = (\sqrt{x})^{\sqrt{x}} \frac{1}{2\sqrt{x}} (\ln \sqrt{x} + 1) \end{cases}$$
 or equivalent expression

(d) $h(t) = \tan^2(\ln t)$

8. (14 points) Let $y = f(x) = e^x(x-1)^2$ on the domain of all real numbers. $(z \not \to s)(a)$ Determine all x and y-intercepts for the curve. x-intercept: set y=0, solve for x, x=1y-intercept: set x=0, y=1, (2) Determine any vertical asymptotes and horizontal asymptotes for the curve y =The function is differentiable every where. So No vertical asymptotes (pt) $\lim_{X\to +\infty} e^{x}(x-1)^{2} = \infty$, $\lim_{X\to -\infty} e^{x}(x-1)^{2} = 0$ So y=0 is the only horizontal asymptote (2) (c) Find all critical numbers for f(x). f(x1 = ex(x-1)2+ ex(2(x-1) $= e^{x}(x^{2}-2x+1+2x-2)$ $= e^{x}(x^{2}-1)$ set f(x)=0 solve for x ue have ex(x2-1) = 0 continued on next page Y= ±1 Critocal numbers 10 are $\sqrt{x=1}$, and $\sqrt{x=-1}$

8. continued. (3) Find the intervals on which $f(x)$ is increasing, and the intervals on which $f(x)$ is decreasing. Determine x and y -coordinates of all local minimum(s) and local maximum(s). Sign of $f(x)$									
	\propto		×<-1	x=-1	-14 241	X= 1	X> \		
	sign of f(x)		+	0	_	0	+	_ (Pt	
fext is increasing on (-00, -1) and (1,00) (pt fox) is decreasing on (-1, 1)								(P)	
	Tocal	mir	nimum	pt is	s ((1,0)		(Ipt)		
local maximum pt is $(-1, +e^{-1})$ $(-1, +e^{-1})$ $(-1, +e^{-1})$ $(-1, +e^{-1})$ $(-1, +e^{-1})$ (e) Find the intervals on which $f(x)$ is concave up and concave down. Find the x and y -coordinates of all of the inflection points.									
f"(x) = $e^{x}(x^{2}+1) + e^{x}(2x) = e^{x}(x^{2}+2x+1)$ set f'(x) = 0 solve for x, $x = -1+\sqrt{2}$									
sign of f'ex,									
	χ	1	xc-1-	-V2 \	x=-1-V2 +-564 x <	1+12 X =	-4+52 x	>-1+52	
na	In etth	(x)	-	+	0 -		0	+	
for is concave up on (-10, -1-12) and (-1+12, +00) for is concave down on (-1-12, -1+12)									
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8. continued.



(f) Using (a)-(e), sketch the curve.

