

MATH 229, Sect 5    TEST II    NAME \_\_\_\_\_  
Prof. J. Beachy    3/23/2001    NO CALCULATORS! Show all necessary work.

1. (20 points) Find the derivative  $f'(x)$  or  $\frac{dy}{dx}$ .

(a) (p156 #35)     $f(x) = x\sqrt{x} - \frac{1}{x^2\sqrt{x}}$

(b) (p183 #19)     $f(x) = (2x - 5)^4(8x^2 - 5)^{-3}$

(c) (p183 #42)     $y = \sqrt{\cos(\sin^2 x)}$

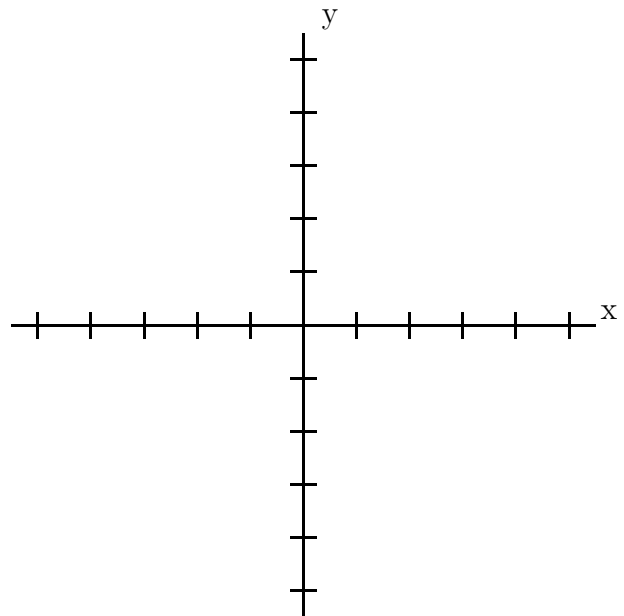
(d) (p190 #51)     $x^2y^2 + xy = 2$     *Simplify your answer.*

2. (5 points; p197 #17)    Find the second derivative  $f''(x)$  for  $f(x) = \frac{1}{\sqrt{1-x}}$ .

3. (6 points; p172) Write out the steps that show that  $\lim_{x \rightarrow 0} \frac{\cos x - 1}{x} = 0$ .
4. (6 points; p239 #14) For the function  $f(x) = \frac{x}{x+2}$ , find all solutions of the equation  $f'(x) = \frac{f(b) - f(a)}{b - a}$  in the interval  $[a, b]$ , where  $a = 1$ ,  $b = 4$ .
5. (6 points; p211 #25) For  $y = \cos x$ , find the differential  $dy$  and evaluate  $dy$  for  $x = \pi/6$  and  $dx = 0.05$ .
6. (7 points; p211 #34) Find the linearization  $L(x)$  of  $f(x) = x^6$  at  $a = 2$  and use it to approximate  $(1.97)^6$ .

7. (7 points; p187 Ex2) Find the equation of the tangent line to the curve  $x^3 + y^3 = 6xy$  at the point  $(3, 3)$ .

8. (18 pts) For  $f(x) = -x^3 - 3x^2 + 4$ , graph the function after finding
- the intervals on which  $f$  is increasing or decreasing;
  - the local maximum and minimum values of  $f$ ;
  - the intervals of concavity and the inflection points.



9. (15 points; p248 #32) For the function  $f(x) = (x^2 - 1)^3$ , find
- (a) the intervals on which  $f$  is increasing or decreasing;
  - (b) the local maximum and minimum values of  $f$ ;
  - (c) the intervals of concavity and the inflection points.

10. (10 points; p199 Ex 1) Air is being pumped into a spherical balloon so that its volume increases at a rate of  $100 \text{ cm}^3/\text{sec}$ . How fast is the radius of the balloon increasing when the diameter is 50 cm? *Hint:* The volume of a sphere is  $V = \frac{4}{3}\pi r^3$ .

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Grade	