

MATH 5A - TEST 2
(2.2-2.6, 2.8, 2.9)

100 points

NAME: _____

FILL IN THE BLANKS WITH MOST APPROPRIATE ANSWER: (2 points)

- (1) If $V(t)$ represents the volume water in the bath tub (in cubic inches) at time t where t is the number of minutes after 6:00 p.m., explain very specifically words, with units, what

$$\left. \frac{dV}{dt} \right|_{t=3}$$

represents

- (2) If $y = \tan x$, the differential, $dy =$ _____.

- (3) $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ _____ (4) If $f(x) = 3x^5$ then $f''(x) =$ _____

- (5) True or False: If f is differentiable at $x=a$ then f is continuous at $x=a$. _____

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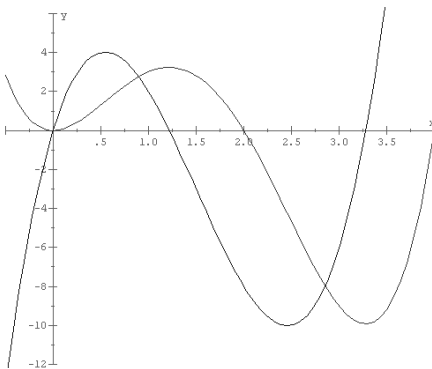
- (6) Given that $f(x) = g(x^2) + [g(x)]^2$, find $f'(x)$.

(3 points)

- (7) The graphs below are of a function and its derivative. Clearly label which is $f(x)$ and which is

$f'(x)$.

(4 points)



In problems 8- 12 , find $\frac{dy}{dx}$. Work carefully, very limited partial credit will be given. Simplify your answers. Do not leave any negative exponents or complex fractions. Combine fractions(8 pts each)

$$(8) y = \sqrt{x} (x^2 + 3\sqrt{x})$$

$$(9) y = \sin\left(\frac{x^2}{2x+1}\right)$$

$$(10) y = \frac{x^2}{\sqrt{9-x^2}}$$

$$(11) y = \cos^3(\sqrt{x})$$

$$(12) \sin(xy) = y^2$$

(13) Use differentials or linear approximation to approximate $\sqrt[3]{2696}$

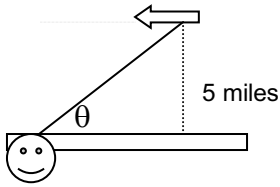
(9 points)

(14) Find the x values of the points on the curve $y = \frac{\cos x}{2 + \sin x}$ at which the tangent is horizontal.

(9 pts)

(15) An airplane flies at an altitude of 5 miles directly toward a point directly over an observer. The speed of the plane is 600 miles per hour. Find the rate at which the angle of elevation, θ , is changing when the angle is 30° . (show units)

(8 points)



(16) A stone dropped into a still pond sends out a circular ripple whose radius increases at a constant rate of 3 cm/sec. How fast is the area enclosed by the ripple increasing when $t=5$ seconds? (show units)

(8 points)

(17) Find equations of both lines through the point $(2,-3)$ that are tangent to $f(x) = x^2 + x$.

(9 points)