

SAMPLE TEST # 2

Show your work.

1. Find the derivatives of the following functions. Do not simplify your answer.

(a) $f(x) = (x^3 - 12x^2 + 5)^{33}$

(b) $g(x) = \tan(x^3 - x + 17)$

(c) $f(y) = y^2 \cot(y^5)$

(d) $k(x) = \sin(x^2 + \sin(x^2 + \sin(x^2)))$

2. Find y' by implicit differentiation when $\frac{y}{x-y} = x^2 + 1$.

3. Find the equation of the tangent line to the curve $y^2 = x^3(2-x)$ at the point $(1, 1)$.

4. Use linear approximation to approximate the value of $\sqrt[3]{28}$.

5. Find the limits.

(a) $\lim_{t \rightarrow 0} \frac{9t^2}{\sin^2(5t)}$

(b) $\lim_{x \rightarrow 0} \tan 3x \cot 5x$

6. A gas balloon is being filled with gas at the rate of $100\text{cm}^3/\text{s}$. At what rate is the radius of the balloon increasing when the radius is 10cm ?

7. Find the first three derivatives of

(a) $f(x) = x \sin x$

(b) $g(t) = \sqrt{7t+1}$

8. A position of a particle is described by a position function $s = f(t) = t^2\sqrt{t^4+1}$. Find

(a) the velocity $v(t)$ at time t ;

(b) the acceleration $a(t)$ at time t .