MATH 1450 EXAM1

NAME————————————————————— **GRADE** ————-OUT OF **15 PTS**

Answer the following questions correctly (no decimal answer!) for a full credit.

1. (**1pt**) Find the ***points*** on the graph of $f(t) = t^3 - 12t + 4$ where the tangent line is horizontal.

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

3. (**1pt**) The position of a body at time t seconds is $s(t) = t^3 - 6t^2 + 9t$. Find the body's **acceleration** each time the velocity is zero.

4. (**4pts**) Find the **derivative** of each function with respect to the variable for which it is defined: do **not** attempt to simplify your final answer.

i) $f(t) = \dfrac{1-t}{1+t}$

ii) $g(r) = \left(r^2 - r\right)^3$

iii) $k(x) = tan(x) + x^{1/4}$

iv) $q(x) = (x+2)(1-x)$

v) $g(z) = cos^{-1}(z-3)$

vi) $y = 2^x + \log_3(x)$

5. (**2.5pts**) Let $f(x) = x^2$ and $g(x) = \sqrt{x}$, find the following (leave your answers in a *simplified form*):

(a) $f(g(x))$ (b) $g(f(x))$ (c) $g'(x)$ (d) $\dfrac{1}{(f'(g(x)))}$ (e) $(f \circ g)'$.

6. (**1pt**) If $h(x) = \sin x$, find in a *reduced fraction form*, $\dfrac{d}{dx} h^{-1}\Big|_{x=5/7}$

7. (**1pt**) If $h(x) = \ln(x^2 - 3)$, find the exact value (*no decimal*) of the slope of the line normal to h at the point $A(2, 0)$.

8. (**3pts**) For each of the following equations, find y'. Leave each answer in a *simplified rational expression form.*

(a) $x^3 - 2xy + y^2 = 0$.

(b) $y = \sin(xy)$.

(c) $\ln x + \ln y = 7x - 7y$.