HL1 Quiz #8 Name: Jerry Jiang 9/10

Mark each of the following statements as true or false.

Absolute Failure

✓ F 1. $\lim_{n\to\infty}(1+\frac{1}{n})^n = 1$ e

✓ F 2. If $f(x) = x^2 \sin x$ then $f'(x) = 2x\cos x$. $-x^2\cos x + 2x\sin x$

✓ T 3. The derivative of $f(x) = \ln x^3$ is $f'(x) = \frac{3}{x}$. $\frac{1}{x^3}\cdot 3x^2$

✓ T 4. The vector $\begin{pmatrix}\cos\theta\\ \sin\theta\end{pmatrix}$ is a unit vector.

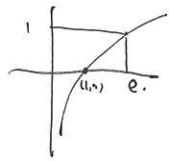
✓ T 5. If $f'(a) = 0$ and $f''(a) > 0$, then the function f has a local minimum at $x = a$.

✓ F 6. A fair die is rolled once. The events $A = \{5\}$ and $B = \{6\}$ are independent. $\frac{1}{6}$ $\frac{1}{6}$ $A\cap B = 0$

✓ F 7. The curve $y = 2x - x^4$ has an inflection point at $x = 0$. $y' = 2 - 4x^3$

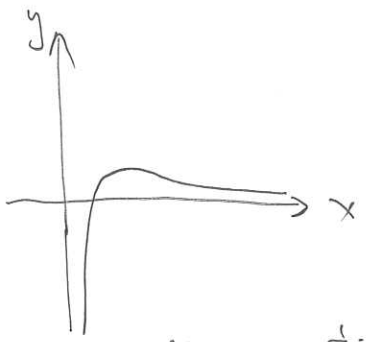
✓ T 8. If $f(x) = e^{-2x}$ then $f^{(8)}(0) = 256$. $e^{-2x} \to e^{-2x}\cdot -2 \to$ $y'' = -12x^2$

(1) $e^{-2x}\cdot -2\cdot -2$ (2) $e^{-2x}\cdot(-2)^8$ $= 256$



✓ F 9. The sum of the series $\sum_{n=0}^{\infty}\frac{d^n}{dx^n}(3^x)$ when $x = 0$ is $\frac{1}{1-\ln 3}$. $\ln 3 > 0$.

✗ T 10. The range of the function $f(x) = \frac{\ln x}{x}$ is $]-\infty, e]$.



$\frac{\ln e^{e^{1000}}}{e^{e^{1000}}}$ $3^x + 3^x\ln 3 + \ln 3\cdot 3^x\cdot\ln 3 + \ln^2 3\cdot 3^x$.

(1) (2)

$= \frac{e^{1000}}{e^{e^{1000}}}$ $3^x(1+\ln 3+\ln^2 3+\cdots+\ln^{\infty} 3)$.

$= e^{1000-e^{1000}}$ $= 3^x\cdot\frac{1-\ln 3^{\infty}}{1-\ln 3}\cdot 1$

$f'(x) = \frac{\frac{1}{x}\cdot x - \ln x\cdot 1}{x^2}$

$= \frac{1-\ln x}{x^2} = 0$

$\ln x = 1$

$x = e$.

$(e, \frac{1}{e})$.