

MATH 220**Test 1****June 30th****Summer 2015**

Name _____

NetID _____

INSTRUCTIONS

- Do not open this test booklet until I say START.
- Turn off all electronic devices and put away all items except a pen/pencil and an eraser.
- Remove hats and sunglasses.
- You must show sufficient work to justify each answer.
- While the test is in progress, we will not answer questions concerning the test material.
- Quit working and close this test booklet when I say STOP.
- Quickly turn in your test to me and show your Student ID.

Problem	1	2	3	4	5	6	7	8	Σ
Score									
Max Score	10	10	10	10	10	15	10	25	100

1. (2 points each) Circle **true** if the given statement is always true. Otherwise circle **false**.

(a) A function which is continuous at a point a must also be differentiable at a .

true or **false** ?

(b) If $f(x) = \cos(x)$ and $g(x)$ is an odd function, then the composite function $(g \circ f)(x)$ is an odd function.

true or **false** ?

(c) If the finite limit $\lim_{t \rightarrow 5} \frac{h(t) - h(5)}{t - 5}$ exists then the function h is continuous at 5.

true or **false** ?

(d) The function $y = \frac{x - 5}{x^2 + 8x - 15}$ has a vertical asymptote at $x = 5$.

true or **false** ?

(e) If the point $(3, -4)$ is on the graph of a one-to-one function $f(x)$ then the point $(4, -3)$ must be on the graph of $f^{-1}(x)$.

true or **false** ?

2. (10 points) Let $f(x) = 6x^2 - 5x$.

Use the definition of a derivative as a limit to prove that $f'(x) = 12x - 5$.

Show each step in your calculation and be sure to use proper terminology in each step of your proof.

3. (10 points) Use interval notation to state the domain of the given function.

$$g(x) = \frac{\ln(144 - x^2) + \sqrt{2x - 6}}{x - 5}$$

4. (10 points) An exponential function has a y -intercept of 12 and passes through the point $(2, 48)$. Determine a formula for this function.

5. (10 points) Determine a formula for $g^{-1}(x)$ given that $g(x) = \ln\left(\frac{4-x^2}{2}\right) + \ln\left(\frac{2}{2-x}\right)$

6. (a) (5 points each) Evaluate the following quantity and simplify your answer. For a given acute angle θ , it is given that $\sec \theta = \frac{3}{2}$. Evaluate the following quantities and simplify your answer.

i. $\cos(\theta + \pi)$

ii. $\sin\left(\theta + \frac{\pi}{2}\right)$

(b) (5 points) Evaluate the following quantity and simplify your answer.

$$\sin(\arctan(\frac{4}{3}))$$

7. (10 points) Find all horizontal asymptotes on the graph of $f(x) = \frac{6 + 3e^x}{8e^x - 4}$

8. (5 points each) Evaluate the following limits without the use of derivatives. Show sufficient justification for each answer. An answer of 'does not exist' is not sufficient. For infinite limits you must state if it is ∞ or $-\infty$.

(a) $\lim_{x \rightarrow 1} \frac{x^3 - 2}{x^2 + 5}$

(b) $\lim_{x \rightarrow 5} \frac{x - 5}{x^2 - 6x + 5}$

(c) $\lim_{x \rightarrow \infty} \frac{(3x + 2)^2}{6 - 4x^2}$

$$(d) \lim_{x \rightarrow 12^-} \frac{\ln(144 + x^2)}{\ln(144 - x^2)}$$

$$(e) \lim_{x \rightarrow \infty} \frac{\sin(x^2)}{2x}$$