

Name: _____
Student ID: _____

Test 1

This test is graded out of 50 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page. This test consists of 9 questions and one bonus question. The maximum possible grade is 50/50. Please ensure that you have a complete test. This test must be returned intact.

Question 1. (5 marks) Simplify the following expressing your final answer with positive exponents only:

$$\frac{(x^3y^{-2})^{-2} z^5}{x^{-8} (yz)^2} \cdot \left(\frac{x^3}{z^{-2}}\right)^{-4}$$

Question 2. Convert the following, show all your work and *use the correct number of significant figures*

- (2 marks) 134500 ft·lb bending moment to MN·m .
- (2 marks) 123.1kPa to psi (pound per square inch).

Question 3. Let $f(x) = \frac{1}{2x+5}$

a. Evaluate and simplify the following:

i. (1 mark) $f\left(\frac{1}{2}\right)$

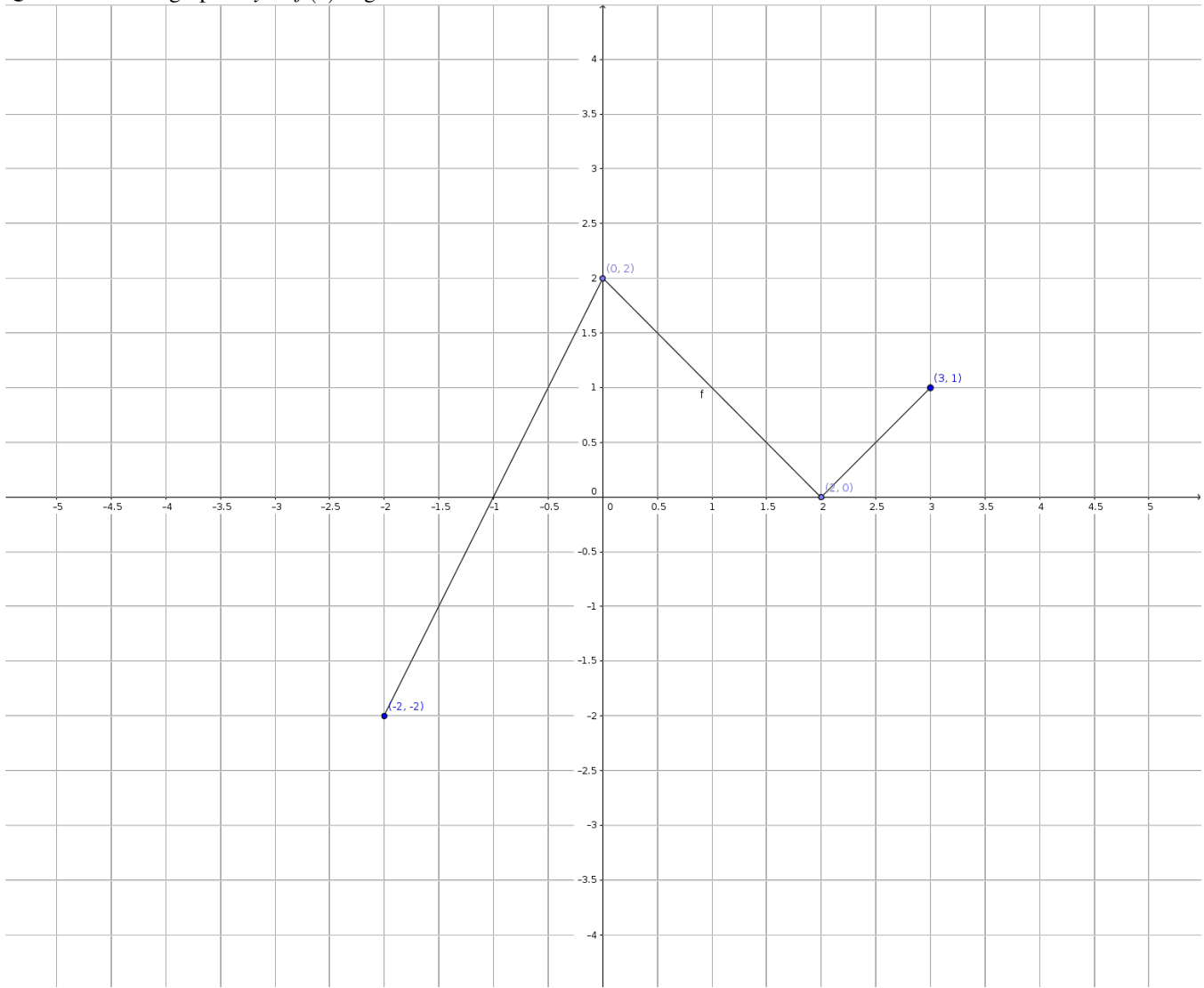
ii. (1 mark) $f(x-2)$

iii. (1 mark) $f(a+h)$

iv. (1 mark) $f(2) + x$

b. (1 mark) Find the domain of $f(x)$

Question 4. The graph of $y = f(x)$ is given below.



- (3 marks) Graph $g(x) = -2f(x-2)$ on the given set of axes.
- (1 mark) State the domain and range of $g(x)$.

Question 5. Let $f(x) = \frac{1}{x-5}$, $g(x) = x^2 + 1$.

- a. (2 marks) Simplify the expression $(f \circ g)(x)$.
- b. (1 mark) Evaluate $(f \circ g)(0)$, if possible.
- c. (1 mark) Evaluate $(f \circ g)(2)$, if possible.
- d. (2 marks) State the domain of $f \circ g$.

Question 6. For each of the following functions, find the inverse $f^{-1}(x)$ and state the domain of $f^{-1}(x)$

a. (3 marks) $f(x) = \frac{1}{2}x^3 + 5$

b. (4 marks) $f(x) = 3 - \frac{1}{2}\sqrt{x-1}$

Question 7. A linear function $f(x)$ has a slope of -2 and passes through the point $(2, 1)$.

- a. (2 marks) Determine the linear function $f(x)$.
- b. (2 marks) Sketch the graph of $f(x)$.
- c. (2 marks) Clearly state and label the x and y intercept on the graph.

Question 8. Consider the quadratic function $g(x) = -2x^2 + 10x - 8$.

- a. (2 marks) Determine the x and y intercept of $g(x)$.
- b. (2 marks) Determine the vertex of $g(x)$.
- c. (2 marks) Sketch the graph of $g(x)$ and label the vertex, x and y intercept on the graph.
- d. (1 mark) State the domain and range of $g(x)$.

Question 9. In room 4H.6 of Dawson College, the percentage humidity in the air H is measured the afternoon hours of a summer day.(fictional data)

t	0.0	1.0	2.0	3.0	4.0	5.0
H	60	63	67	68	72	71

- (4 marks) Find the least-squares line for H in percentage as a function of the time t in hours from noon.
- (2 marks) At what time of the day can we predict the humidity in room 4H.6 to be 66%.

Bonus Question. (3 marks)

A function f is called even if $f(-x) = f(x)$ for all x in the domain of f .

A function f is called odd if $f(-x) = -f(x)$ for all x in the domain of f .

Find a function which is both even and odd.