

## Final Practice Exam Math 160

1. Simplify the following expressions:

(a)  $\frac{10^{12}}{10^3}$ .

(b)  $e^7 \times e^3$ .

(c)  $e^{x+2} \times e^{x^2-x-2}$ .

2. Solve the following equations:

(a)  $4 + (7x - 1) = 12x - 8$ .

(b)  $2x^2 - 6x = 0$ .

(c)  $\frac{3}{x+1} = 2x - 6$ .

3. Find the equation of the line that passes through (1, 3) and (7, 12) and answer the following questions:

(a) What is the  $y$ -intercept of the line?

(b) What is the  $x$ -intercept of the line?

(c) Is it parallel to the line  $y = \frac{3}{2}x + 1$ ?

4. Solve the following inequalities:

(a)  $2x - 3 > 8$ .

(b)  $|2x - 1| > 4$ .

(c)  $\frac{2x - 1}{3x + 4} < 5$ .

5. Let  $f(x) = x^2 - 3x$  and  $g(x) = 3x - 7$

(a) Find  $f \circ g(0)$ .

(b) Find  $f \circ g(1)$ .

(c) Find  $f \circ g(a)$ .

(d) Find  $g \circ f(2)$ .

(e) Find  $g \circ f(b)$ .

6. Suppose that the demand and price for a certain brand of shampoo are related by

$$p = 16 - \frac{5}{4}q,$$

where  $p$  is price in dollars and  $q$  is demand.

(a) What is the price if the demand is 4 units?

(b) What is the demand for the shampoo at a price of \$16.

Suppose the price and supply of the shampoo are related by

$$p = \frac{3}{4}q,$$

where  $q$  represents the supply and  $p$  the price.

(c) Find the supply when the price is \$10.

(d) Find the equilibrium quantity.

(e) Find the equilibrium price.

7. Find the equation of the parabola that has a vertex at  $(-1, -2)$  and passes through the point  $(1, 2)$ .

8. Suppose you are the manager of a firm. The accounting department has determined that the cost estimate for a new product is  $C(x) = 65x + 7000$ . The sales department expects a revenue of  $R(x) = 300x - x^2$ . You know that you can only produce at most 150 units. How many units must the firm sell to break even?

9. Calculate the following logarithms:

- (a) Find  $\log_3(1)$ .
- (b) Find  $\log_2(8)$ .
- (c) Find  $\log(10^{10})$ .
- (d) Find  $\ln(10)$ .
- (e) Find  $\ln(10^{10})$ .

10. Solve the following equations:

- (a)  $2^x = 128$ .
- (b)  $100(1.02)^x = 256$ .
- (c)  $x^7 = 2187$ .

11. Suppose Alice deposited \$1000 dollars into an account compounded annually. After five years, Alice finds out she has \$1503 in her account. She forgot what the annual interest rate in her account was. Find the interest rate.

12. Find the following limits (if they don't exist write DNE):

- (a) Find  $\lim_{x \rightarrow 2} \frac{1}{x+2}$ .
- (b) Find  $\lim_{x \rightarrow 2} \frac{1}{x-2}$ .
- (c) Find  $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$ .
- (d) Find  $\lim_{x \rightarrow \infty} \frac{1}{x-2}$ .
- (e) Find  $\lim_{x \rightarrow \infty} \frac{3x^3 - 7x^2 + 18000}{2x^3 - 2}$ .

13. Find the following derivatives:

- (a)  $x + 2$ .
- (b)  $x^3 + x - 2$ .
- (c)  $\frac{x^2 - 4}{x - 2}$ .
- (d)  $\frac{1}{x - 2}$ .
- (e)  $(x^2 + 5x)^{10}$ .
- (f)  $e^{3x^2}$ .

14. Let  $f(x) = 3x^2 - 7x + 2$ .

- (a) Find the minimum of  $f(x)$ .
- (b) Find  $f'(x)$ .
- (c) Find  $f'(3)$ .
- (d) Find the equation of the line tangent to  $f(x)$  when  $x = 3$ .