MATH 160 Practice Exercises

1. Suppose f(x) = $\sqrt{3x^2+2}$. Evaluate f(9).

2. Using "x" as your independent variable and "y" as your dependent variable, write an equation for the line that passes through the points (14, 36) and (6, 60).

3. A new machine that costs $35,000 has a useful life of ten years and a scrap value of $5,000. Using straight-line depreciation, find the equation for the value V of the machine in terms of t where t is years.

4. It was estimated that for a small plant producing Product A, fixed costs are about $400,000 per year and it costs about $20 to produce each unit of Product A. This plants is able to sell all its Product A output at $50 per unit. Let C(u), R(u), and P(u) represent the plant's cost to produce u units of Product A, its revenue gained from the sale of u units of Product A, and its profit derived from the production and sale of u units of Product A respectively.

   a. Specify the plant's cost function.
   b. Specify the plant's revenue function.
   c. Specify the plant's profit function.
   d. Determine the plant's break-even quantity.

5. Assume that the yield response of a type of grain to nitrogen fertilizer is given by $y = 2000 + 30x - 0.2x^2$ where y is in pounds per acre and x is pounds of nitrogen per acre. How much nitrogen results in a maximum yield? (Express your answer in terms of lbs/acre.)

6. Suppose x is a number such that $0 \le x$ and $x \le 10$. That is, x lies between zero and ten inclusive. If $f(x) = 1000 + 12x$, then for what value of x is f(x) a maximum? For whatvalue of x is f(x) a minimum?

7. Suppose x is a number such that $0 \le x$ and $x \le 10$. That is, x lies between zero and ten inclusive. If $g(x) = 5(x-5)^2 + 20$, then for what value(s) of x is g(x) a maximum? For what value(s) of x is g(x) a minimum?

8. Suppose that $f(x) = -2(3x-1)^2$ and $g(x) = (x+2)$. Evaluate: $(f \circ g)(1) = f(g(1))$.

9. Write out the expression you would evaluate to answer the following question. The current population of a small country is 200,000 and is growing at the rate 2% per year compunding continuously. What does that information suggest that the country's population will be in five years?

10. Write out the expression you would evaluate to answer the following question. A customer owes $3000 on a credit card account that charges interest at the rate of 20% per year compounded monthly. Assuming no further charges or payments are made, how much will the customer owe at the end of 8 months?

11. Write out the expression you would evaluate to answer the following question. A customer invests in an account that pays interest at the rate of 4% per year compounded monthly. Assuming no further deposits or withdrawals are made, how much must the customer deposit initially so the account will grow in value to $20,000 in 10 years?

12. Where does the graph of the function $h(x) = x^2 - 3x - 10$ cross the x-axis? That is, for what x does h(x) = 0?

13. Very carefully graph the function $f(x) = -x^2 + 12x - 20$. Label the vertex and x-intercepts.

14. Evaluate each of the following limits:

a. $\lim_{x \to 4}(2x+5)$ b. $\lim_{x \to \infty}\left(\frac{8x+10}{2x}\right)$ c. $\lim_{x \to 0^+}\left(\frac{x+10}{x}\right)$ d. $\lim_{h \to 0}\left(\frac{2(5+h)^2-50}{h}\right)$