

Do NOT write your name anywhere. (Canvas will tell me who turned in the exam.) Take pictures of your answers and use your own software or <https://pdfcandy.com/> to create a PDF for each answer which requires an upload. If it is large, resize it to A4. Upload that to Canvas. Upload each answer as a separate file with that question. Failure to follow directions will cost you one point. People with Apple products may need to use CamScanner app.

You are not allowed to use your books, notes, the internet, or other people when taking this test. You can use the internet to access Canvas and to convert your answers to PDF files. Nothing else.

If you run out of time or lose your internet connection, you can do a second submission. You do NOT have to redo the questions you already did. I will be able to see every submission. If you have problems, you can always contact me via Zoom or e-mail. If you use Zoom, open it in a new tab or window.

Failure to follow these directions will cost you 1 point. The test has 100 points (to be scaled up to 140 points) and is scheduled to take 50 minutes. Therefore, expect to spend 1 minute for every 2 points. For example, a 12-point question should take 6 minutes. I have it set up to only give you an hour and a half.

**Show all work on all questions.**

1) (10 points) Answer EITHER Part A OR Part B.

A) In ECON 202, we have a function  $C(Y) = 1000 + 0.8 \cdot I$ .  $C$  is the amount of consumption.  $I$  is the amount of income. Rewrite the consumption function in the point-slope form. What is the interpretation of the .8? State how you determined the interpretation. (I am assuming you have had no economics.)

B) When climbing a mountain, the temperature might be written as  $T(A) = 90 - \frac{1}{2}A$ .  $A$  is the altitude in 100s of feet. Rewrite the equation in the point-slope form. What is the interpretation of the  $-\frac{1}{2}$ ? State how you determined the interpretation.

2) (14 points) Answer EITHER Part A OR Part B.

A) The height of a rocket fired from a submarine at time  $t$  is given by  $H(t) = -\frac{1}{2}t^2 + 10t - 2$ . Write it in the standard form. At what point in time does it reach the maximum height? How high is it then? I will give you a bonus point if you can tell me what the  $-2$  represents.

B) The profits as a function of output are given by  $\Pi(Q) = -2Q^2 + 200Q - 200$ . Write it in standard form. At what quantity are profits maximized? What are the profits then? I will give you a bonus point if you can tell me what the  $-200$  means.

3) (16 points) Answer EITHER Part A OR Part B.

A) Suppose that a boat is sailing at a constant speed. At 2:00, it had gone 100 miles and at 3:00, it had gone 200 miles. Suppose we want to draw a graph with distance,  $D$ , on the Y-axis, and time,  $T$ , on the X-axis. Find the equation for the distance as a function of time,  $D(T)$ . Write it in the slope intercept form. What is the X-intercept, a.k.a. T-intercept? What does that tell us? Do NOT actually graph it.

B) Suppose that a fire is burning acreage at a constant rate. At 4:00 it had burned 30 acres and at 5:00 it had burned 40 acres. Suppose we want to draw a graph with acres,  $A$ , on the Y-axis and time,  $T$ , on the X-axis. Find the equation for the acreage as a function of time,  $A(T)$ . Write it in the slope intercept form. What is the X-intercept, a.k.a. T-intercept? What does that tell us? Do NOT actually graph it.

4) (18 points) Answer EITHER Point A OR Point B.

A) The profits as a function of output are given by  $\Pi(Q) = -2Q^2 + 26Q - 20$ . Find the range where the profits are at least 40. Write your answer in interval form.

B) Suppose the temperature  $t$  hours after 6:00 AM is given by  $T(t) = 20 - t^2 + 8t$ . Find the range where the temperature is above freezing (32 degrees). Make sure you write it as the time of day in interval form.

5) (20 points) For EITHER the function in Part A OR the function in Part B, find the zero(s), x-intercept(s), and y-intercept(s) if they exist. Then plot the function.

A)  $f(x) = |2x| - 2x - 4$

B)  $f(x) = |3x+3|/(3x+3)$

6) (22 points) Answer EITHER Part A OR Part B.

A) Find where  $|x+3| - |2x-2| < 2$

B) Find where  $|3x-9| - |x+1| > 0$