

Name \_\_\_\_\_

Student ID # \_\_\_\_\_

Section \_\_\_\_\_

HONOR STATEMENT

“I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam.”

SIGNATURE: \_\_\_\_\_

1	5	
2	5	
3	10	
4	15	
5	15	
Total	50	

- Please check that your exam contains 5 problems on 4 pages.
- Please turn your cell phone OFF and put it away for the duration of the exam.
- Unless otherwise indicated, you must show your work. The correct answer with no supporting work may result in no credit.
- If you use a guess-and-check method when an algebraic method is available, you may not receive full credit.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!

1. (5 points) Let  $f(x) = 2x^2 - 8$ . Compute

$$\frac{f(x+h) - f(x)}{h}$$

and simplify as much as possible (assume  $h \neq 0$ ).

2. (5 points) For which value(s) of  $\alpha$  does  $3x^2 + 2\alpha x + 1 = 0$  have exactly one solution?

3. (10 points) Pam lives in an apartment building on the corner of Shuffle Street (which runs east–west) and Flap Avenue (which runs north–south). She works in a studio on Shuffle Street, ten miles east of her apartment. To get to work, Pam catches the Shuffle Street Express bus, which travels east along Shuffle Street. The bus makes no stops between Pam’s apartment and her studio and travels at a constant speed of 40 miles per hour.

There is a wireless “hotspot”, 0.25 miles north and 3 miles east of Pam’s apartment that allows anyone within a 1650 foot radius to connect to the internet. If Pam has her laptop on the bus, how long (in minutes) can she connect to the internet?

Reminder: there are 5280 feet in 1 mile.

4. (15 points) On the day Clam University offered its first class ( $t = 0$ ), 852 students were enrolled. Enrollment increased and reached a maximum of 3600 students 10 years later.

(a) Assume that Clam U's enrollment at time  $t$  is a **quadratic function**

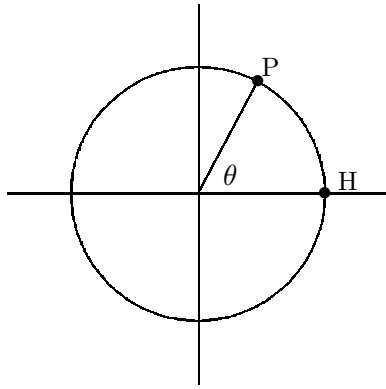
$$C(t) = a(t - h)^2 + k.$$

Find the values of  $h$ ,  $k$ , and  $a$ .

(b) The left-handed student population of Clam U is a **linear function** of time. At  $t = 0$ , there were 200 left-handed students at Clam U; at  $t = 10$ , there were 950. Give a formula for  $L(t)$ , the number of left-handed students at time  $t$ .

(c) Every student at Clam U is either left- or right-handed. When is the right-handed population the largest?

5. (15 points) The graph of  $f(x)$  is made up of a portion of a parabola and a line segment:



(a) Fill in the missing portion of the multi-part rule for  $f(x)$ :

$$f(x) = \begin{cases} x^2 + 6x + 8, & \text{if } -6 \leq x \leq 0 \\ , & \text{if } 0 \leq x \leq 10 \end{cases}$$

(b) What are the domain and range of  $f(x)$ ?

(c) Let  $g(x) = \sqrt{x-3}$ . What is the domain of  $(g \circ f)(x)$ ?