

chapter one

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Up until April of this year, I was a math professor at Roberts College, in the tiny town of Westbridge, Massachusetts, on the far western border of the state. Roberts was a small liberal arts college, endowed with excellent students, a beautiful New England campus, and deep pockets. I couldn't imagine a better job than teaching those highly motivated students the mathematics that I love, and also having the time to work on my own research in mathematics. It was a dream job. On top of that, Roberts was set in the Berkshire Mountains, which by anyone else's standards are not mountains at all, but they are still some of the prettiest hills you have ever seen.

Spring break ended at the beginning of April, and we had just returned for the last six weeks of the semester. It was a Friday, and I was reviewing for my calculus class the fact the derivative $f'(x)$ of a function $f(x)$ is the slope of the tangent line to the graph of the function at x . I had drawn this picture (Fig. 1.1) on the board.

Megan, one of those students who always sits in the first row, and who really has a true appreciation for the beauty of mathematics, had asked the perfect set-up question.

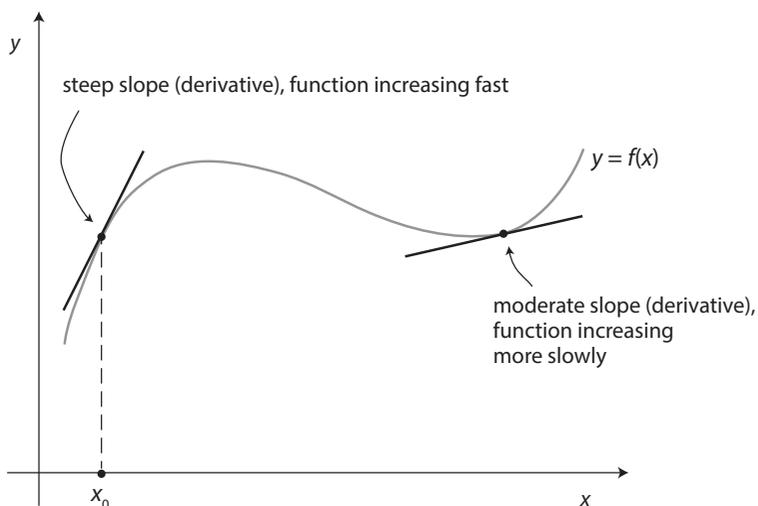


Figure 1.1: The derivative is the slope of the tangent line.

“But Professor Williams, what if the graph isn’t smooth? What if it has a kink? How do you know which tangent line to use?”

I smiled. “Great question, Megan. I’m glad you asked.” She returned the smile, pleased with the compliment. Megan tended to dress on the conservative side, and that day, she was wearing a tan cashmere sweater over a white blouse, with pearls and a matching tan skirt. Thora, who was sitting just behind Megan, and who had chopped purple hair and more piercings than I could easily count, gave a barely audible groan.

“Suck up,” she muttered, just loud enough for Megan and me to hear. I ignored Thora’s interjection. In fact, Thora was just as talented as Megan, but she did her best to hide it.

I drew this next picture (Fig. 1.2) on the board.

“At this point, any of these lines could be valid tangent lines. So there’s no well-defined slope, and therefore no

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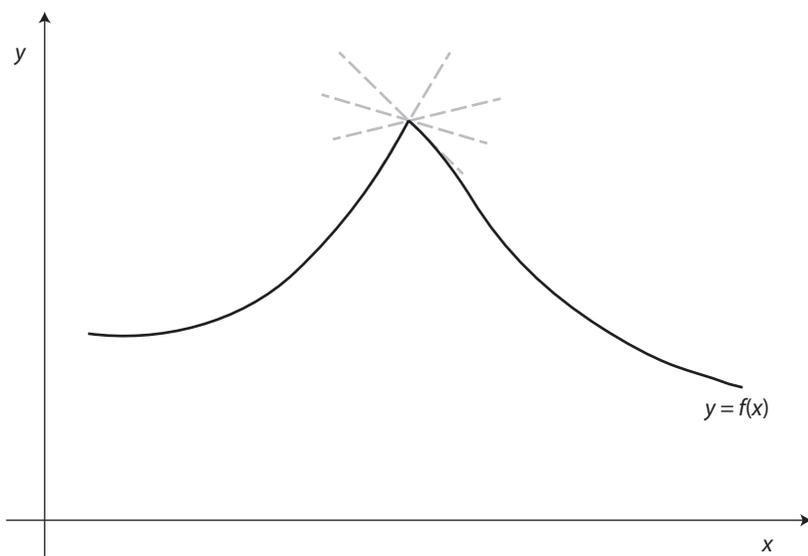


Figure 1.2: A graph with a point where there is no unique tangent line.

well-defined derivative. So the derivative doesn't exist at this point." Megan nodded as I spoke.

It was at this moment that through the window I noticed one of my perennially late students shambling toward class. He was looking particularly disheveled, and I wondered to myself about the appropriate tack to take when he entered the classroom. Charlie wasn't a bad kid, and he wasn't bad at the math either. He was just a serious flake who was too disorganized to attend class regularly or turn homework in when it was due. If I had to guess, I suspected the reason he was late this Friday was a drunken binge the night before. Thursday night parties were becoming more and more of a problem.

Although I anticipated the door opening, I continued on. "At all the other points on the graph other than the kink

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point, there is a perfectly good tangent line, and therefore, everywhere else the derivative is defined.” Charlie still didn’t enter. This distracted me to the extent that I finally crossed to the door and opened it. Charlie was standing in the lobby facing away from me.

“Are you going to join us, Charlie?” I asked.

He turned to look at me, his expression suggesting he didn’t register who I was. But then his lips pulled back into what might have been a grimace and what might have been a bizarre smile. There was definitely something off-kilter about him. His eyes looked filmy, and his posture seemed all wrong. Spittle hung off his chin. That must have been some party.

He shuffled forward and I backed into the room, not sure what to make of him. He stopped when he saw row after row of students staring at him. I tried to regain my composure.

“Nice of you to join us, Charlie. Perhaps you would like to take a seat.” I motioned to the front row.

Charlie lurched forward and instead of taking the seat I had intended, he fell on top of Megan. Initially I and all the other students assumed Charlie had tripped, and there was a broad giggle from the class. But almost immediately, Megan started shrieking, and suddenly blood was spurting out. Charlie made guttural snarling noises as Megan flailed about. It took me a moment to register what was happening, but then I leaped forward.

“Get off her!” I screamed. Grabbing at Charlie’s arm, I tried to pull him back, but his teeth were embedded deep in Megan’s neck. I pulled harder, putting all my weight into it, and the three of us toppled back onto the floor, with me on the bottom and Megan on the top. Charlie never released his grip as he climbed back on top of her and continued to chew on her neck.

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Tom and Manuel, two of the biggest students in the class, both members of the front line of the football team, leaped up from their seats at the front of the room. They tended to sit near the door to make their escape as soon as possible. Tom grabbed Charlie around the waist and Manuel held onto Megan as Tom tried to pull Charlie away. There was a ripping sound and much of Megan's neck came off in Charlie's mouth. By now there was lots of screaming.

Charlie then turned around as Tom was struggling with him and bit Tom's nose off. At this point, people started bolting for the door, knocking each other over in an attempt to get out. Tom fell over backward screaming, and Charlie fell upon him.

"Get out, everyone get out," I cried over the tumult. Shrieking students scrambled out the door. Thora sat frozen in her seat. I grabbed her by the arm and pulled her up. "Run!" I screamed, as I pushed her through the door ahead of me.

Charlie continued to feast on Tom. I slammed the door behind me, and ran across the lobby to the department's administrative assistant's office. Having heard the commotion, Marsha was standing in her doorway. She was dressed in her usual color-coordinated manner. Today it was red high heels, red dangly earrings, red lipstick, and a short red skirt with matching red stockings.

"What's going on, Craig? Give back an exam today?"

I pulled her into her office and shut the door. "Call security! Call the Westbridge police! Call a SWAT team from somewhere! A student's gone completely insane. He's killed two students."

Marsha laughed. "It's a little late for April Fool's."

"No April Fool's," I said, handing her the phone. "Call! Call now!" She could tell by the tone of my voice that I wasn't

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kidding and she began to dial. I peeked out the door, but the lobby remained empty. All the students from my class had gotten as far away as possible. I realized I had to clear the building as quickly as I could. Cautiously, I stepped out into the lobby and pulled the fire alarm on the wall. As the alarm sounded, flashing blue lights strobed on and off in the lobby. Almost immediately students and faculty poured out of the classrooms into the lobby.

“Get away from the building,” I yelled. “This is a real emergency. Get far away from the building.” Within five minutes, the lobby was again empty. I then cautiously crossed to the door of the classroom to check that it was still latched shut. I could hear slurping sounds emanating from inside. Slipping out the front door of the building and keeping low, I snuck around the outside to the window I had looked out when I had first spotted Charlie. I peered in, and saw Charlie still chomping on Tom, blood oozing down his jaw.

I reentered the lobby as Marsha came out of her office.

“Security and cops are on the way,” she said.

“Thank God,” I said.

“What’s going on in there?” she asked.

“You don’t want to know,” I replied.

“Actually, I do want to know,” she said.

Before I could explain, we heard someone coming down the hall that connected the back door of the building to the lobby. It was Hoyle, the Westbridge police chief. Stuffed into his uniform like a sausage in its casing, he had a perpetually angry expression on his face. I had never been a particular favorite of his since the time I stood up at a town meeting and argued that we should cut the town’s police budget. I didn’t see the point of having three on-duty police officers for a town that averaged one crime every six months.

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“What the hell is going on?” demanded Hoyle over the fire alarm. He ignored me and turned to Marsha. “Did you make that call?”

Marsha nodded and pointed at me.

“There’s a crazy student in 106,” I said as calmly as I could muster.

“So call Psych Services. Why’re you calling me?”

“Umm, because he’s killed two students.”

“You’re the one who sounds crazy right now,” said Hoyle. “Did you pull the fire alarm?”

“Yes,” I replied. “I had to get everyone out of the building.”

He walked over to the alarm box, inserted a key and silenced the alarm. Then he walked over to the door to the classroom.

“Really!” I said. “He bit them, and then started eating them.”

“A little late for April Fool’s isn’t it?” he replied, as he pulled out his gun, and reached for the door handle.

“I wouldn’t do that,” I said, as he pushed open the door.

From my vantage point I could see blood coating the linoleum. I could also see Charlie kneeling over Tom’s prone form. But the sight that was the most disturbing was Megan standing in front of her desk. Her head was tilted at a funny angle due to the chunk of her neck that was missing, but she was definitely up and about. She saw Hoyle, gave out a guttural moan, and immediately moved for him. Lucky for him, as she stepped forward, her foot slipped in the blood on the floor, and she went down hard, her head bouncing on the tile.

Charlie looked up at this point and realized a better meal had presented itself. As he rose from the floor, I could see Hoyle fiddling with the safety on his gun. Charlie reached

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him just as the gun went off. Both Charlie and Hoyle went down.

“Oh, shit,” I mumbled. I could see Megan struggling to get up, as Charlie sank his teeth into Hoyle’s leg.

“Holy crap,” cried Hoyle. “Help me!” He reached imploringly in my direction.

Hoyle’s gun lay on the floor just out of his reach.

“Don’t,” said Marsha, but I couldn’t just watch the rest of this scene unfold. I ran across the lobby and grabbed up the gun. Pointing it at Charlie’s chest, I pulled the trigger. There was a loud explosion and the force of the bullet knocked him flat on his back. Hoyle started to crawl away. As I reached down to help him, Charlie inexplicably lifted his head off the tile. He seemed unfazed by the gaping wound in his chest as he reached out and grabbed at Hoyle again.

“What the hell,” I uttered incredulously.

“Shoot him again,” screamed Hoyle. I lined the gun up on the side of Charlie’s face and pulled the trigger. Brains flew out the other side of his head, and he collapsed. Hoyle crawled out from under him and pulled himself through the doorway. I just stood there with the gun held limply in my hand. In the meantime, Megan had managed to regain her footing. She slowly stepped forward, seemingly aware that a fast movement would put her back on the floor. As she was reaching for us, I grabbed hold of the door handle and slammed the door shut. I was shaking uncontrollably. I had never shot a gun before, let alone at a student, crazed or not.

“Jesus Christ, that was some messed up student,” said Hoyle wincing. “Help me up.”

Hoyle wrapped an arm over my shoulder and I hoisted him to his feet. He motioned for his gun, which he reholstered. Then, as I supported him, he used his shoulder radio to call the police station.

“Chuck, pick up. We need serious backup . . . Chuck. Come on. Pick the hell up. Where the goddamn hell are you?” He clicked off his radio in frustration.

“There’s always supposed to be someone there,” he said to me. With my support, he hobbled across the lobby.

Marsha motioned to the glass door of the lobby.

“Thank God. Here’s campus security,” she said. I saw Hollister, one of the college security guards, heading toward the building. Marsha clattered on her high heels to the door and pushed it open.

“Hurry!” she yelled as she held the door for him. At that moment, I noticed that Hollister’s gait looked peculiar. He was not bending at the knee as he shuffled forward.

“Marsha, let the door go,” I screamed as I pointed at Hollister. As he was reaching a crabbed hand for her, she suddenly grasped the reality of the situation and ducked back into the building, slamming the door. Hollister’s face smashed up against the glass as he flailed about, desperate to sink his teeth into her.

Marsha sank back, horrified.

“What the hell is going on?” I asked to no one in particular, staring as Hollister continued to ram his face into the glass door.

“Oh, my God,” whispered Marsha in horror. We watched as he tried to bite through the smooth surface, his saliva smearing the glass.

“We have to get out of here,” said Marsha.

“Not sure that’s such a good idea,” I said.

“What do you mean?” demanded Hoyle. “Of course we have to get out of here.”

“Look,” I said. “In the last fifteen minutes, three people have either tried or succeeded in killing and eating others.”

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“So, that seems to be an argument for getting as far away as possible,” said Marsha.

“Actually, it’s not,” I replied. “The point is that if two of the three people who have tried to enter the building are crazy, it is very unlikely that they are the only two who are crazy. But if a whole lot of people are crazy, then it’s not so surprising that two who tried to come in are crazy. It’s probability.”

“So you’re trying to say that there are lots of others who are nuts?” asked Hoyle. “And if we go outside, our chances of survival plummet?”

“That’s exactly what I’m trying to tell you,” I said. “Come on. We can check it out from the windows upstairs.”

With Marsha on one side and me on the other, we managed to help Hoyle up the stairs to the second floor. As I pushed open the fire door to the stairwell, we collided with Angus. He was a student who had taken Calculus I with me two years previous and had somehow managed to pass the class, just barely. For some unknown reason, that had convinced him to be a math major.

“What’s going on?” he asked. He used to ask that a lot in class, too. “I heard the fire alarm and a lot of screaming.”

“We don’t know exactly, but people are acting crazy,” I replied.

“Very crazy,” added Marsha.

From down the hall, I saw a head poke out an office door. It was Jessie, a professor in the Biology Department with a strong mathematical bent. She had been my wife’s best friend, and my wife had helped her through a difficult divorce. When my wife was diagnosed with breast cancer, Jessie was there for us through the entire two-year ordeal, which culminated in my wife’s death five years ago. After that, Jessie did her best to console me and help with my

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kids, and that led very quickly to an ill-conceived attempt at a relationship. But it had been much too soon for me. The relationship disintegrated quickly and after that we had avoided each other. But under the circumstances, these personal issues seemed suddenly peripheral.

“Craig, get down here,” she called. With Angus and me helping Hoyle, we made it down the hall. Jessie locked the door once we were inside. Sitting in Jessie’s office chair was Oscar Gunderson.

“Hello, Williams,” he said. Those were the first words he had spoken to me in eight years.

Gunderson was tall and thin, with a shaved head and thick-rimmed, stylish, chunky, black glasses that looked out of place on his long face. He sported the carefully trimmed stubble that always looked to be much more trouble than the careless attitude it was supposed to project. His clothes always conformed to whatever *Men’s Style* announced as the latest fashion.

Gunderson had arrived at Roberts College three years before me. As the hot young applied mathematician with a National Science Foundation grant to support his research and invitations to speak all over the world, he had cruised through the tenure process. Then, three years later, when I came up for tenure, I barely scraped by, as I was to learn afterward. I had plenty of papers, both single author and with my students. But Gunderson had been on my tenure review committee. He argued that my chosen field of low dimensional topology was dead, and that it would be a big mistake to tenure someone in an area that would soon cease to exist. He also argued that the fact I was publishing papers with students meant it couldn’t be good work. Lucky for me, there had been other senior faculty in the department who believed in me, and I had received tenure in spite of his

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best efforts. Two years later, Perelman proved the Poincaré Conjecture using some of my work on Ricci flow. So my supporters were vindicated and I had plenty to work on for the next half century. I ignored Gunderson as we lowered Hoyle into a chair.

“Jessie, do you know what the hell is going on?” I asked. She motioned to her window, which gave a good view of the science quad.

There was mayhem below. Hollister had obviously given up on getting into the Science Center, and we watched as he managed to grab hold of a student’s hair as she ran past. He jerked her off her feet and fell upon her as she screamed desperately. We saw several other people feasting on bodies. Various faculty and students wandered around the quad with that identifiable stilted gait. When an uninfected person ran past, they would turn after them in pursuit. Most of the runners would escape to safety, but once in a while someone would trip, or dodge one infected person only to stumble into another.

“I checked on the internet,” said Jessie. “It’s a virus of some kind. Spreading fast. Started in Boston, maybe at one of the university labs, but no one knows for sure. It shuts down all your higher brain functions, everything we have evolved over the last fifty million years. All that’s left is the basics.”

“What basics?” asked Marsha.

“Breathing, and the need to eat. Those functions have been around all the way back to the very beginning.”

“They’re zombies,” said Angus.

“They are not zombies,” said Jessie. “They are sick human beings.”

“What’s the difference between them being zombies and them being sick human beings?” asked Marsha.

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“Zombies are in the movies,” said Jessie.

“This is like a movie,” said Marsha, “a horror movie.”

“It’s the Z virus,” said Angus. “Probably coming out of research funded by the military. They’re always trying to create a superweapon.”

“How do you know that?” asked Gunderson.

“Everybody knows it,” said Angus. “It’s the basis for half the sci-fi movies out there.”

Jessie smiled. “You know, it might not be a conspiracy. Might just be some scientists trying to find a cure for an existing virus, and they messed up.”

“Does it matter which it is?” asked Gunderson.

“This is all very messed up,” I said. “I have to call my kids.” I pulled my cell phone from my pocket and dialed my seventeen-year-old daughter Ellie’s cell. I waited three rings anxiously and then, much to my relief, she answered.

“Honey, are you okay?”

“Yeah, Dad, but something crazy is going on. They sent us all home from school an hour ago. Said there was some virus, and everyone should go home. I tried to call you but you must have had your phone off because you were teaching. People were acting crazy when the bus went by campus. What’s going on?”

“It’s nuts, honey. Is your brother there?”

“Yeah. He got sent home, too.”

That was a relief. Ellie was very sensible and trustworthy in an emergency. Her twelve-year-old brother Connor was anything but.

“Okay, look. I want the two of you to lock every door of the house. Don’t let anyone in. Then go upstairs and lock yourselves in the master bedroom. Bring some snacks and drinks with you. And the dog. And don’t leave. Got it?”

“Dad, you’re scaring me.”

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“You should be scared, honey. It’s very dangerous. I’ll get there as soon as I can.”

“Hurry, Dad.”

I hung up. Angus was staring out the window.

“Look at the way they move,” he said. “Very stiff. And they all seem to move at the same speed.”

“True,” I said. I watched as Travis McCutcheon, star of the track team, lurched across the quad at the same pace as Reverend Mitchell, the seventy-year-old college chaplain.

“Looks like they move at about a yard a second,” said Angus.

“A constant derivative,” said Gunderson.

“What do you mean?” asked Angus.

“Haven’t you taken calculus?” asked Gunderson.

“Sure,” replied Angus.

“Who did you have?” asked Gunderson. Angus turned and pointed at me.

“Figures,” said Gunderson.

“Angus, you do know this,” I said. “The derivative of a function is just the rate of change of the function, which we measure by how steep the tangent line is. So if a function is changing fast, it has a high derivative and if it is changing slow, it has a low derivative.”

“Yeah,” said Angus. “That sounds right.”

“If the function happens to be the distance you have travelled in a certain time,” I continued, “then the derivative is just the rate of change of the distance travelled, which is your speed.”

“I thought speed was distance divided by time,” said Marsha.

“That’s right,” I replied, “if you’re moving at a constant speed. If you’re going 50 miles an hour for an hour, you go 50 miles in that hour. But you could also go 50 miles

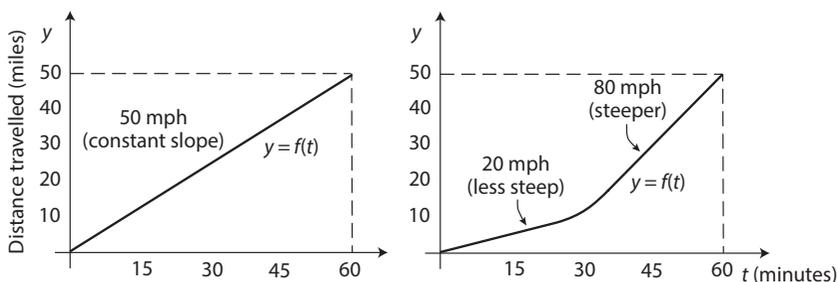


Figure 1.3: Two ways to travel 50 miles in an hour.

in an hour by going 20 miles per hour for half of the time and then speeding up to 80 miles per hour for the rest of the time.” I drew Figure 1.3 on the white board hanging on the wall.

“Oh yeah,” said Angus. “Your speed usually varies. So when you’re going 20 miles per hour, your derivative is 20 mph and when you are going 80 miles per hour, your derivative has increased to 80 mph. Like when you start running. You start at a slower speed but then you build up to a faster speed. So your derivative changes. Like Doctor Ortiz there.”

Raphael Ortiz, a faculty member in chemistry, had been hiding behind a bush, his orange polo shirt barely visible. But he had seen an opening, so he made a break for it. It took him a second to get up to speed, but I could see he was in good shape as he sprinted toward the parking lot. He attracted several zombies, including McCutcheon and the chaplain, but he had a good head of steam and had no trouble outdistancing them. As Angus had pointed out, he started slower but got going faster until he reached his top speed, which he maintained for most of the distance. He had strong incentive.

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Ortiz easily made it to his car but then took a second fumbling with his keys as the zombies converged toward him. He managed to get the door open before they arrived, and slammed it shut just as the first reached him. Within seconds, McCutcheon, the chaplain, and two other zombies surrounded the car, banging on it as they slobbered over the windows. Ortiz got the car started and jerked the car backward out of its parking space, causing the chaplain to fall in front of the car. Ortiz then slapped it into drive and floored it. The car immediately bumped over the chaplain and sideswiped another car. At this point Ortiz realized that an abandoned car blocked the gate to the parking lot.

He swung his car around the other side of the lot and gunned it over the curb onto the quad itself. As he continued to accelerate, his tires chewed two big tracks into the college's carefully manicured lawn. I couldn't help but think of my neighbor Winsted, who was the head of Buildings and Grounds. He would not be happy about this.

As the car cut a swath across the quad, all of the rest of the zombies in the quad were distracted from their assorted atrocities and headed toward it. Ortiz didn't seem too concerned for them as they lurched in front of the car. He mowed down three in a row. But when the next one to step in front of his car was Karen Holm, chair of the Chemistry Department and, at least according to the rumor mill, his lover, he swerved to miss her and plowed into the big oak in the center of the quad. The front end of the car crumpled as the air bag deployed.

All the zombies now converged on the car, but as far as I could tell, the glass had not shattered and the passenger compartment was intact. Steam rose from the cracked radiator. Ortiz wasn't moving.