1/2

1. Show the initialization of TCCR0 neede to generate a PWM (use Fast PWM mode) signal on pin 6 of PORTB (OC0) of the ATmega32 with a clock division of 64.

2. Using the above initialization, calculate the period of the PWM waveform. Show your work.

3. Using the initialization from problem 1, calculate the value written to OCR0 that results in a 75% duty cycle. Show your work.

4. Write a complete .asm file that consists of a program that increments a 16-bit number (that starts at zero). Don't worry about the value in the 16-bit number overflowing, it should just start over at zero once 0xFFFF is reached. The program should just be a tight loop that does the increment. In addition, an ISR must be created that will interrupt the program every 2 ms and display the result (on the LEDs) of performing an exclusive or operation on the high and low bytes of the 16-bit number being incremented in the main program.



Name:

5. Explain where the GNU compiler would store the value of variable z in the following C function:

```
uint8_t add(uint8_t x, uint8_t y)
  uint8_t z;
  z = x + y;
  return z;
}
```

6. Describe the purpose of the extern keyword.

7. Write an asssembly function that will be called by C. The function should have the following prototype:

```
/* triplets — Compares three unsigned 16-bit integers. If all three
* values are the same, the function returns 1; otherwise 0 is returned.
*/
uint8_t triplets(uint16_t x, uint16_t y, uint16_t z);
```

8. Which of the four Timer/Counter0 subsystem modes (normal, CTC, PWM phase correct, and PWM fast) allow the period of the waveform on OC0 to be fine tuned beyond what is possible with the clock select settings?