

Show all work. You may leave arithmetic expressions in any form that a calculator could evaluate. By putting your name on this paper, you agree to abide by the university's code of academic integrity in completing the quiz. Use no books, calculators, cellphones, other electronic devices, communication with others, scratchpaper, etc.

Name _____

1. (10) Give a bound on the backward error in approximating the two solutions to the equation $x^2 + 15x + 55.948 = 0$ by $x_1 = -7$ and $x_2 = -8$.

2. (10) Consider the following MATLAB code fragment:

```
x = 1;
delta = 1 / 2^(50);
for j1=1:20
    x = x + delta;
    delta = delta / 2;
end
```

Use your knowledge of double-precision floating-point arithmetic (53 bit mantissa, with exponents in the range $[-1022, 1023]$) to predict what the final values for `x` and `delta` will be. Briefly explain your prediction.