

Physics 234: Quiz 4
Wednesday, March 9, 2011

Student's Name: _____

1. π has a nonterminating binary representation $(11.001001000011111101101010100010\dots)_2$. We can approximate it on our machine as a single-precision floating-point number `float pi` with this bit pattern: `0/10000000/10010010000111111011011`.

Match each of the following expressions with the correct bit pattern. Write the corresponding letter in the space provided.

(a) `-pi` (b) `2.0F*pi` (c) `-pi*0.5F` (d) `25.0F/8.0F` (e) `nan`

- ___ `0/10000000/100100000000000000000000`
- ___ `0/11111111/100100000000000000000000`
- ___ `0/10000001/10010010000111111011011`
- ___ `1/10000000/10010010000111111011011`
- ___ `1/01111111/10010010000111111011011`

2. Which algebraic expression suffers from the greatest loss of significance?

- (a) `2*pi`
- (b) `pi/2`
- (c) `pi-25.0F/8.0F`
- (d) `pi+3.0F`

3. Which of the following statements is false?

- (a) Machine epsilon values for the `float` and `double` types are 2^{-23} and 2^{-52} , respectively.
- (b) There's no distinction between `0.0` and `-0.0`.
- (c) The comparison `x == y` is generally unsafe if `x` and `y` are floating-point types.
- (d) `1.0/0.0` is `inf` whereas `0.0/0.0` is `nan`.