Math 150 Questions for Help Session Candidates

1. Solve the following equations for x and state the exact solution:
   (a) $3^{x+5} = 4^{2x}$
   (b) $8^{5x} = 16^{3x+2}$
2. Given that $p = 2 - 5i$ and $q = -3 + 4i$, find $\frac{p}{q}$ and simplify.
3. Find the angle between the two vectors: $\vec{u} = -2i + 3j$ and $\vec{v} = i - 4j$.
4. What is the domain of $f(x) = \dfrac{\sqrt{x+5}}{x^3 - 9x}$?
5. A 5'9" girl is standing 14 feet from a statue. If the angle of elevation from the top of her head to the top of the statue is $63°$, how tall is the statue?
6. Find the value(s) of w such that the point $(w, -3)$ is seven units away from the origin.
7. Find all solutions for $(w^2 - 2)^2 - 3(w^2 - 2) - 18 = 0$ ...
   (a) Over the set of all real numbers:
   (b) Over the set of complex numbers:
8. Given $f(x) = 2x^2 - 3x + 4$ and $g(x) = 5x - 4$ find $(g \circ f)(x)$ and simplify completely.
9. Given the vectors $\vec{u} = 4i - j$ and $\vec{v} = -2i + 2j$, find the projection of $\vec{v}$ onto $\vec{u}$.
10. $\log_a 2 = 0.2789$, $\log_a 3 = 0.4421$, and $\log_a 2 = 0.7831$, find $\log_a \left(\dfrac{14}{3a^2}\right)$
11. Given that $\sin(u) = \dfrac{5}{13}$, where $0 < u < \frac{\pi}{2}$ and $\cos(v) = -\dfrac{3}{5}$ where $\frac{\pi}{2} < v < \pi$, find $\sin(u + v)$.
12. A boat travels 440 miles from A to B with a bearing of N 32° W. Then it travels 320 miles from B to C with a bearing of N 83° W. Draw a figure that gives a visual representation of the problem and find the straight line distance AND bearing from C to A. Give answers within 3 significant digits.
13. Simplify the following identity to a single term:
    $\csc(x)(\csc(x) - \sin(x)) + \dfrac{\sin(x) - \cos(x)}{\sin(x)} + \cot(x)$