Math 172 - Test 1

September 20, 2017

Name _____

Score _____

Show all work to receive full credit. Supply explanations where necessary.

1. (8 points) Find an equation of the line tangent to the graph of $y = \dfrac{e^{2x} + e^{-x^3}}{2}$ at the point where $x = 1$. Round your numbers to two decimal places.

2. (6 points) Solve each equation. Round your answers to three decimal places.

   (a) $2^{5-x} = 750$

   (b) $\log_3 x^2 = 4.5$

3. (10 points) For $x > 2/3$, let $y = \dfrac{x^2\sqrt{3x-2}}{(x+1)^2}$. Find dy/dx.

4. (14 points) Evaluate the indefinite integral: $\displaystyle\int \frac{x}{x^2-4x+13}\,dx$

5. (8 points) Consider the function $f(x) = \sqrt{4 - x^2}$, $0 \leq x \leq 2$.

   (a) Algebraically determine $f^{-1}(x)$.

   (b) Sketch the graph of $f(x)$ along with the graph of the line $y = x$.

   (c) Based on your graph, explain the relationship that you notice between f and f^{-1}.

6. (8 points) Evaluate the integral: $\displaystyle\int x\, 5^{-x^2}\, dx.$

7. (8 points) Find the exact value of each expression. Show all work and/or explain your reasoning. (You may refer to your trig unit circle.)

   (a) $\sin^{-1}\left(-\frac{1}{2}\right)$

   (b) $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$

   (c) $\csc^{-1}(\sqrt{2})$

   (d) $\cos^{-1}(0)$

8. (8 points) Let $h(x) = 7 - x - x^3$.

   (a) Explain how we can be certain that h has an inverse

   (b) Compute $(h^{-1})'(-3)$.

9. (8 points) Find dy/dx.

(a) $y = 3^{-4x}$

(b) $y = x^{\sin x}$

10. (8 points) Evaluate the definite integral: $\displaystyle\int_1^3 \frac{e^{3/x}}{x^2}\,dx.$

11. (6 points) Determine the derivative of $\sin(\cos^{-1} x)$. (3 extra credit points if you find the derivative two different ways.)

12. (8 points) Find the area of the 1st quadrant region under the graph of $y = \dfrac{x^2 + 4}{x}$ over the interval from $x = 1$ to $x = 4$.