EXAM 4 - MATH 112 Thursday, April 18

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Compute the following derivatives:

$\left(3x^5 + 7e^{2x} - \ln x\right)' =$

$\left(\dfrac{xe^{3x}}{x+7}\right)' =$

(b) Find an equation for the tangent line to the graph of $f(x) = x^3 \ln x + \dfrac{e^x}{x}$ at $x = 1$.

2. Compute the following integrals:

(a) $\int \frac{4x^5 + 7x^2 - x^3 e^{5x}}{x^3} dx$

(b) $\int \frac{(x+3)(x-1)}{x^2} dx.$

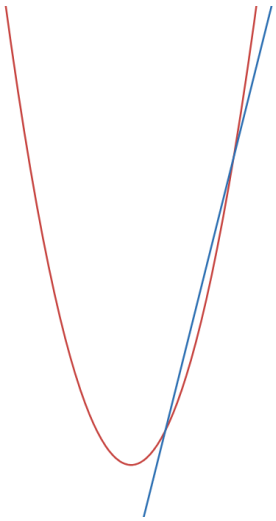
3. A moving object has velocity $v(t) = 12e^{-0.03t} - 10$ m/s at time t seconds into its orbit.

   (a) Find at which time the object has velocity 14 m/s.

   (b) Find the acceleration function $a(t)$ of the object.

   (c) Find an equation for the distance function $s(t)$ if it is known that at time $t = 0$ the object was 300 m away from the origin.

4. Find the area of the region enclosed by the graphs of $f(x) = x^2 + 3$ and $g(x) = 4x$. Show all steps by hand; avoid using calculators.



5. Find the average value of $f(x) = 4x^3 + 10e^{5x}$ over the interval $[0, 2]$.